MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINES AND RECLAMATION BUREAU
ABANDONED HARDROCK MINE PRIORITY SITES
PROJECT REPORT

Meagher County (Beaver Creek District)
Through
Missoula County (Woodman District)

MONTANA STATE LI
1515 East 6th Ave
Cap No. 201800
Helena, MT 59620-18

Meagher County

Beaver Creek	SE NW S24	PA # 30-017
	Lane	PA # 30-019
	Bigler	PA # 30-067
	Porcupine	PA # 30-069
Castle Mtn.	Cumberland	PA # 30-004
	Belle of the Castle	PA # 30-007
Smith River	SW NE S10	PA # 30-078

Mineral County

Cedar Creek	Cajun Queen No. 1	PA # 31-049
Iron Mountain	Iron Mountain Millsite	PA # 31-010
	Gold King	PA # 31-067
	Belle of the Hills	PA # 31-072
	Dillon Millsite	PA # 31-073
Keystone	Nancy Lee Mine	PA # 31-001
	Keystone	PA # 31-074
	Little Anaconda	PA # 31-077
	Hopkins	PA # 31-078
	Nancy Lee Millsite	PA # 31-082
	Nancy Lee Mill - Slowey	PA # 31-090
Packer Creek	Tarbox-Mineral King	PA # 31-003
	Salteste Consolidate	PA # 31-021

Missoula County

Cramer Creek	Linton	PA # 32-017
Elk Creek	Morse & Kennedy	PA # 32-033
Ninemile	Joe Wallit	PA # 32-010
	Lost Cabin	PA # 32-011
	Nugget	PA # 32-042
	Hautilla	PA # 32-057
Woodman	Ward Lode	PA # 32-005
Woodman	Upper Triantler	PA # 32-048
Woodman	Mill Creek Mine	PA # 32-049

MEAGHER

BEAVER CREEK

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BEAVER CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SE NW S24 **PA#:** 30-017

Date: July 28, 1993 **Time:** 1315-1400

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; 60°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #1: WR-3; #2: Shaft at WR-2; #3: WR-1. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Shafts are HMOs; closure complicated by use of shafts for illegal garbage dumping.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close HMOs. Grade and revegetate dump material. Determine whether garbage must be removed from shafts prior to backfilling.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SE NW S24 **PA#:** 30-017

Legal Description: T 9N ;R 4E ;Sec. 24 , SE1/4 NW1/4 1/4

County: MEAGHER **Mining District:** BEAVER CREEK

Latitude: N 46° 32' 10" **Longitude:** W 111° 10' 10"

Primary Drainage Basin and Code: Big Birch Creek/10030103
Secondary Drainage Basin: Gipsy Creek

USGS Quadrangle map name(s): Gipsy Lake

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Hi-Tariff Silver, Inc., c/o Golden Eagle Mining Co., Box 1127, 504 Bank Street, Wallace, ID 83873; Mary Ann Manger, P.O. Box 5567, Helena, MT 59604. (406) 442-9868.

Relationship to other mines/sites in the area/district: Follows a parallel vein to the Lane site.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5800'-5900', **Slope** 5° ,
Aspect Eastern

Land use: Mining___, **Recreational**___, **Residential**___, **Urban**___,
Agricultural X , **Other(Specify)**

Area of disturbed/unvegetated lands? < 1 **acres.**
Dimensions:

Predominant vegetation types: Blue bunch wheat grass, sage

Access: roads - good X ,**poor**___,**4wd**___,**trail**___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on a ridge above a dry drainage. Water flowing off the site would flow north into dry drainage. The dry drainage meets an intermittent unnamed drainage, which meets Gipsy Creek, which then flows into Big Birch Creek 1/4 mile from confluence. No information available on geology.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

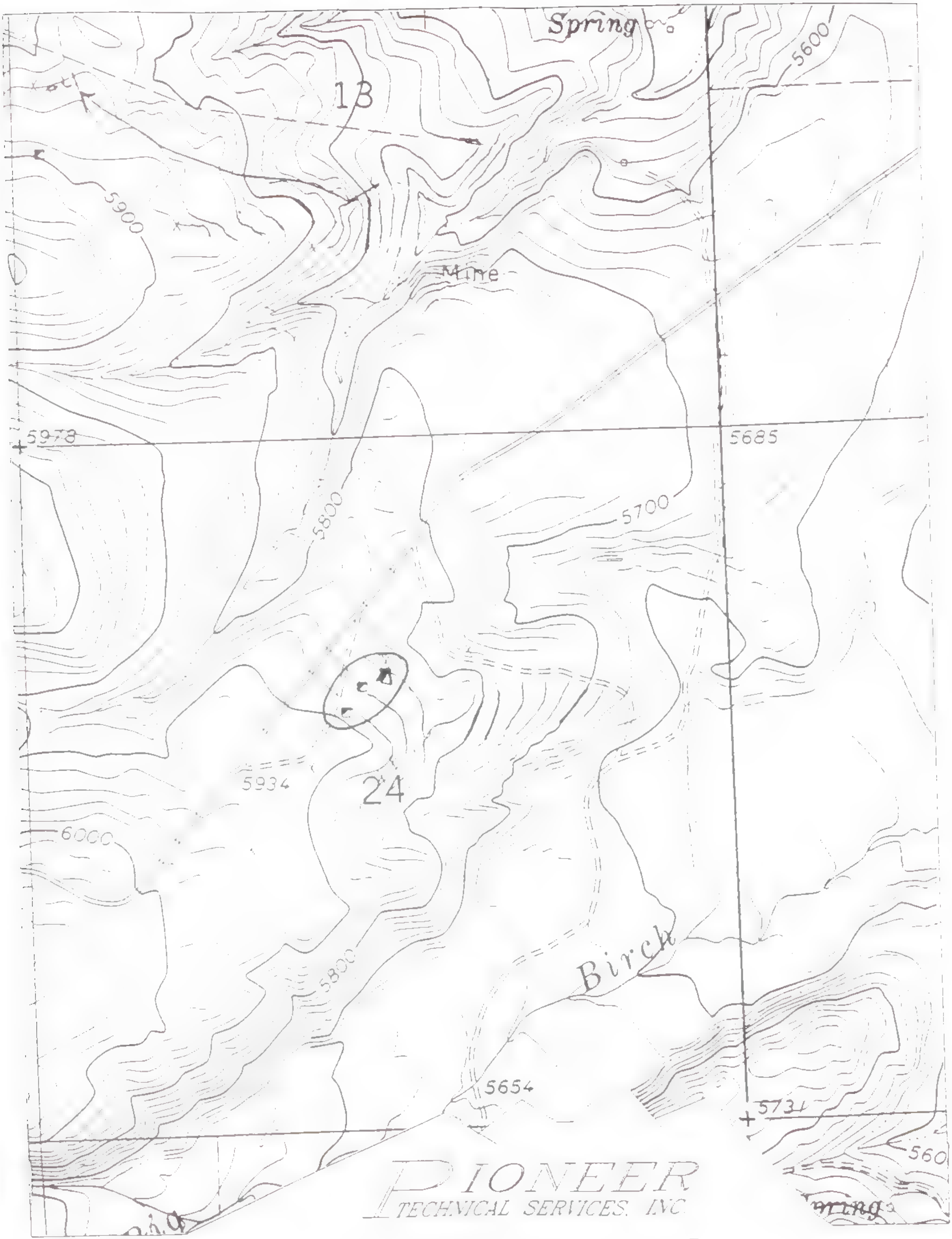
Mine Operation?
Shafts - Yes X, No ___, # 4, Comment ___
Adits - Yes ___, No X, # ___, Comment ___
Pits - Yes X, No ___, # 2, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

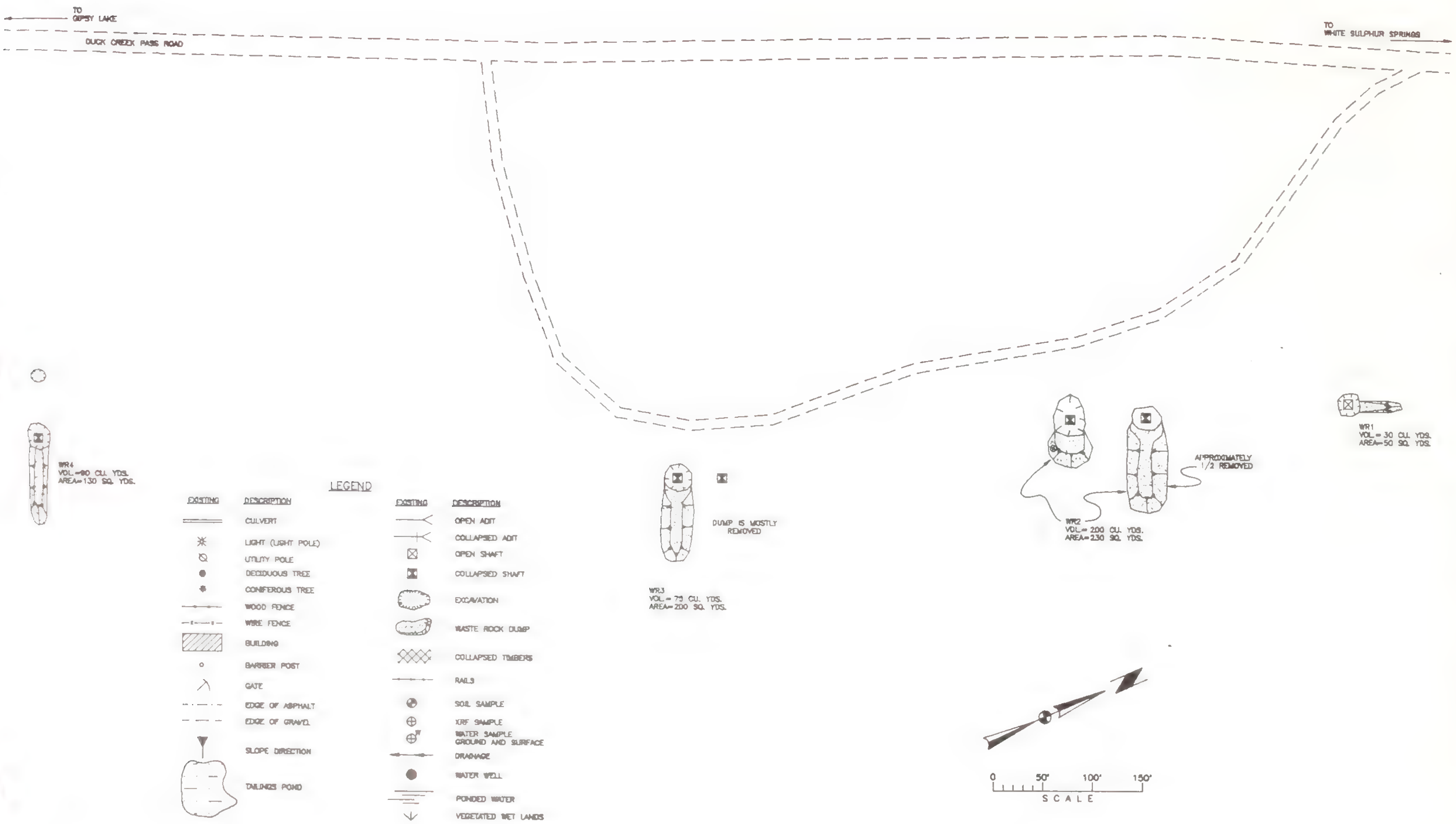
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? N/A



PIONEER
TECHNICAL SERVICES, INC.

SE NW S24, P.A. NO. 30-017
T09N, R04E, SECTION 24
SCALE: 1" = 1000'



DRAWN JTP DATE 8 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
SE NW SECTION 24 PA# 30-017
BEAVER CREEK DISTRICT MEAGHER COUNTY

SHEET NO.

30-017.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	30	Northern most shaft	None	6.9 (D)	0.05	N/A	N/A	XRF Analysis
WR-2	WR	200	Shaft dump south of WR-1	None	6.8 (D)	0.03	30-017-WR-1	07/28/93 1945	T-Metals, ABA
WR-3	WR	75	Shaft dump south of WR-2	None	6.8 (D)	0.035			
WR-4	WR	90	Southern most shaft	None	N/A	N/A	N/A	N/A	N/A

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-017-WR-1 is composite of WR-2 and -3.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 5

Distance to nearest well used for drinking? Approx. 0.75 mile to nearest residence, but no well log was found.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Localized groundwater contamination possible from precipitation percolation through elevated metals and household garbage.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):____________

Dry streambeds: Yes____, No_X_, Name(s):____________

Other surface water: Yes____, No_X_, Name(s)/Description:____________

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A

High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?_

0.5 mile to Big Birch Creek

Surface water draining onto or through waste sources: Yes____, No_X_,

Describe:____________

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)

Agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X_, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

MDSL AMRB/PIONEER 4/9/93

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Soil fizzes when acid is applied.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 0.75 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	Minimal SO3	Dry	450	450	No	Low
WR-2	Minimal SO3	Dry	2,070	2,070	No	Low
WR-3	Minimal SO3	Dry	1,800	1,800	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Off-road vehicle tracks within 10 feet of an open shaft.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________
Wilderness Area - Yes___, No_X_, Comment______________
T&E Species Habitat - Yes___, No_X_, Comment______________
Bat Habitat - Yes___, No_X_, Comment______________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_6_, types and locations: Shafts and exploration pits

Hazardous structures: Yes___, No_X_, Number____, types and locations:______________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for SE NW Section 24, Prepared by Northern Engineering and Testing, June 27, 1988.

USGS, Topographic Map, Gipsy Lake, Montana, 7 1/2 minute Quadrangle, 1971.

LABORATORY ANALYTICAL DATA

SE NW S24
PA NO. 30-017

SE NW Section 24 PA# 30-017
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/28/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30-017-WR-1	184 J	226 J	7.9 JX	1.4 U	3.7 J	1240 J	9530	2.25 J	245 J	3 J	3910 J	108	328 J	NR
BACKGROUND	24 J	116 J	0.8 UX	5.2 J	12.2 J	20.2 J	13400	0.032 J	361 J	7 J	19 J	10 U	39 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-017-WR-1	0.04	1.25	2.49	1.24	0.02	<0.01	0.02	0.00	2.49

LEGEND

WR1 - Composite of subsamples WR2 and 3.
BACKGROUND - From the Lane Mine (30-019-SS-1).

XRF ANALYSIS RESULTS

SE NW S24
PA NO. 30-017

Mine Name: SE NW Section 24 PA# 30-017
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-017-WR-1		26537.6	6840.13	617.379		4178.03	18511.6		155.497	561.404		261.325
30-017-WR-1-COMP		13323.6	4449			718.605 *	21854.1		1609.48	893.241		237.846
30-017-WR-2		12061.9	3802.94			595.524 *	22057.2		1201.47	1039.85		224.718
30-017-WR-3		14291.8	5009.51			739.912 *	21908.8		2780.35	833.598		220.428

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-017-WR-1	103.904		10.3959 *	420.681	114.245			1058.75			20.495 *
30-017-WR-1-COMP	92.2525		78.9655	3011.14	81.1917		231.85	1302.76	126.257 *		19.1102 *
30-017-WR-2	85.3676		27.5305	1751.5	55.6795		200.013	963.033	139.055 *		18.0239 *
30-017-WR-3	102.939		130.533	4433.05	120.639		388.122	1153.32	90.755 *		33.3603 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SE NW S24
PA NO. 30-017

AIMSS SCORESHEET

SITE NAME: SE NW SEC. 24
PA NUMBER: 30-017

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.416
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	83
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.456
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	3
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	55
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.046
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	23
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.042
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	3
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	19
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.00**

SITE NAME: SE NW SEC. 24
PA NUMBER: 30-017

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	600
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	600
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	3
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**36.00**

30-017, #2: WR-2 and shaft

30-017, #1: WR-3 and shaft opening

30-017, #3: WR-1 and opening

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LANE PA#: 30-019

Date: July 28, 1993 Time: 1430-1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Clark, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Clear; slight breeze; approx. 70°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #4: Mine vicinity. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Small HMOs.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Replace dump material in the HMOs.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LANE PA#: 30-019

Legal Description: T 9N ;R 4E ;Sec. 13 , NW1/4 SW1/4 ___1/4

County: MEAGHER Mining District: BEAVER CREEK

Latitude: N 46° 32' 21" Longitude: W 111° 10' 40"

Primary Drainage Basin and Code: Big Birch Creek/10030103
Secondary Drainage Basin: Thompson Gulch

USGS Quadrangle map name(s): Gipsy Lake

Mine Type/Commodities: Hardrock/Copper, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Thomas and Mary Ann Lane, P.O. Box 1238, Livingston, MT 59047. (406) 222-6900.

Relationship to other mines/sites in the area/district: Adjacent to SE NW S24 site which developed vein on adjacent outcrop.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5700'-5880' , Slope 5°-30° , Aspect East

Land use: Mining___, Recreational___, Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? < 0.5 acres.
Dimensions: Small dumps

Predominant vegetation types: Bunch grass, sage brush

Access: roads - good___,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites).
Walk-in access

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in headwaters of intermittent drainage, Thompson Gulch. Thompson Gulch was dry during this investigation. Water leaving the site would flow northeast into Thompson Gulch.

Mining/milling history, ore type/tenor, host rock, gangue: Mine is not discussed in literature; however, principal metal production in Beaver Creek was gold, which occurred as free gold in small quartz veins and stringers. Gold veins usually contain pyrite, chalcopyrite, and galena and generally occurs in Precambrian Belt shales near igneous intrusions.

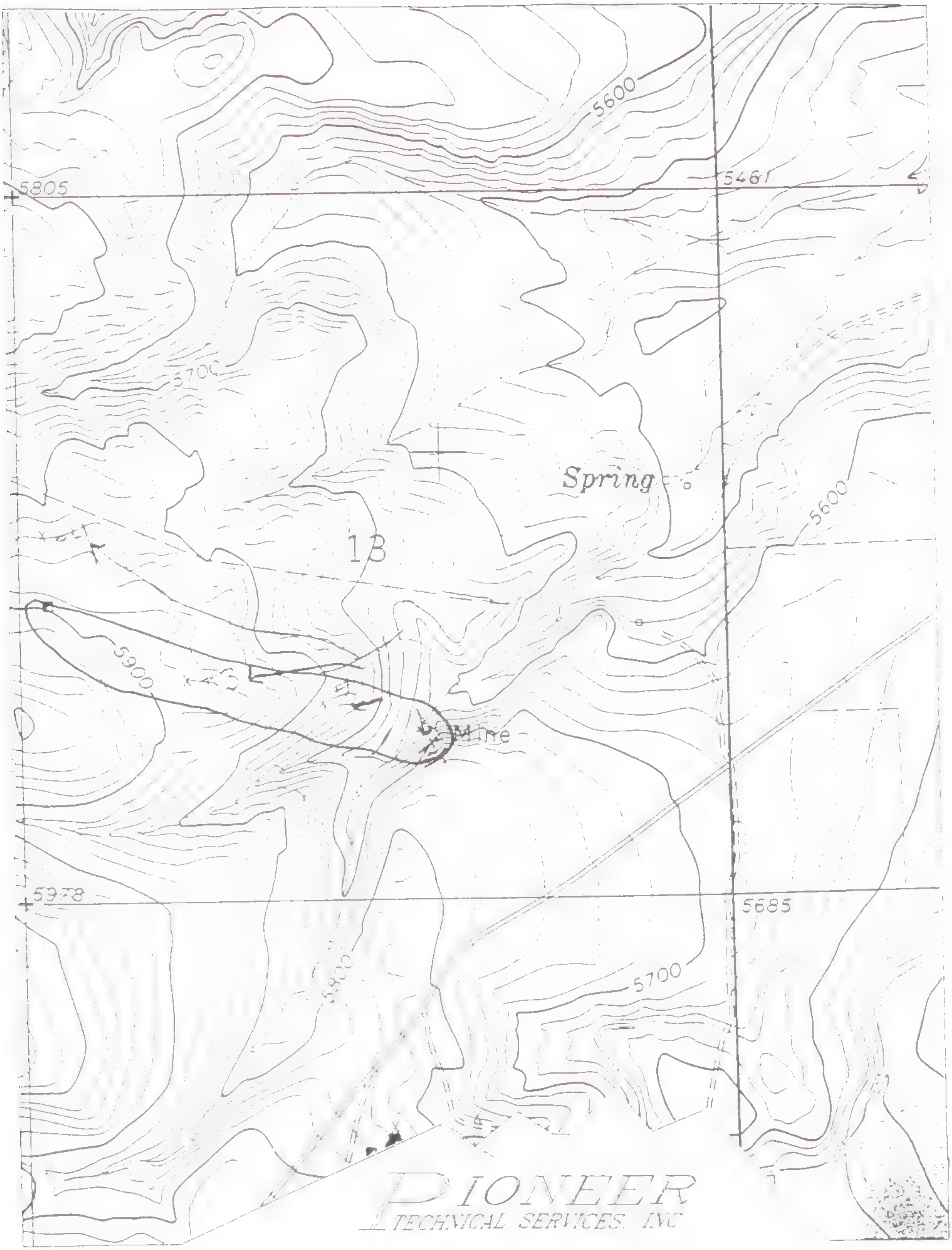
Mine Operation?
Shafts - **Yes** X , **No** ___, **#** 3 , **Comment** Open; shallow
Adits - **Yes** X , **No** ___, **#** 1 , **Comment** Open; shallow
Pits - **Yes** X , **No** ___, **#** 4 , **Comment** Open; shallow
Placers - **Yes** ___, **No** X , **#** ___, **Comment** ___
Other - **Yes** ___, **No** X , **#** ___, **Comment** ___

Mill Operation? Yes ___, **No** X . **If yes answer the next three questions:**

Period(s) of Operation: N/A

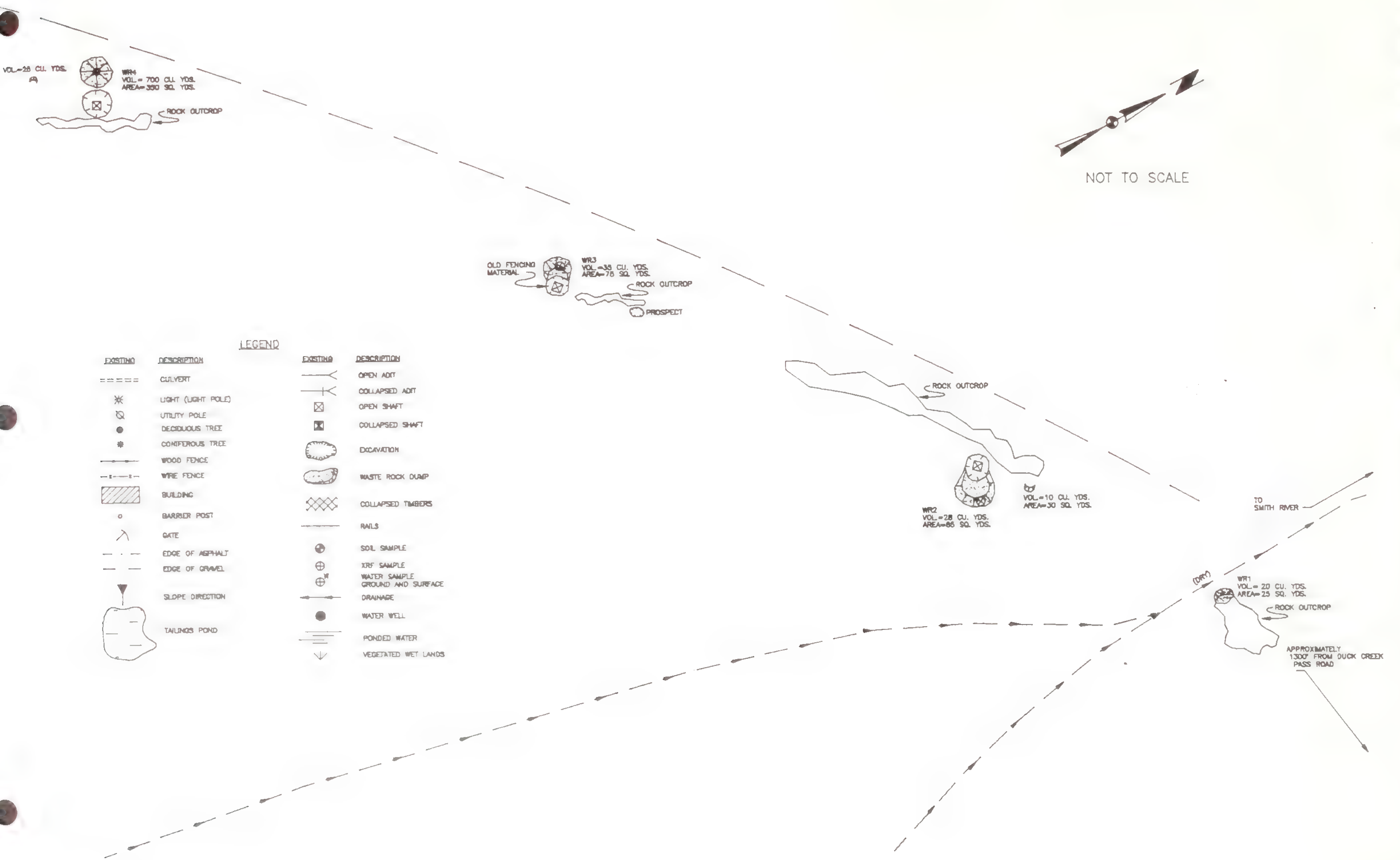
Origin of Ore Milled - Custom Mill ___ **Dedicated Mill** ___; **Number and names of mines that supplied mill feed:** N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC

LANE, P.A. NO. 30-019
T09N, R04E, SECTION 13
SCALE: 1" = 1000'



DRAWN JTP DATE 8 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
LANE PA# 30-019
BEAVER CREEK DISTRICT MEAGHER COUNTY

SHEET NO.

30-019.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	20	Small dump at adit in the drainage	None	N/A	N/A	N/A	N/A	N/A
WR-2	WR	38	Dump between WR-3 and drainage	None	N/A	N/A	N/A	N/A	N/A
WR-3	WR	35	Dump south of WR-4	None	6.9 (D)	0.05	30-019-WR-1	07/28/93 1930	T-Metals, ABA
WR-4	WR	700	Dump at the top, northern most, opening; east side	None	6.9 (D)	0.045			
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	30-019-SS-1	08/28/93 1700	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: No XRF samples taken from WR-1 and WR-2. 30-019-WR-1 is composite of WR-3 and WR-4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_7_____

Distance to nearest well used for drinking?_Approx. 1.5 miles_________

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Shallow workings on a hillside; groundwater is probably 100 to 150 feet below the bottom of the workings.

Other observations/notes: Garbage has been illegally dumped in the shaft associated with WR-3, which may cause minor localized groundwater problems associated with garbage.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Thompson Gulch

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:___________, Average Flow:______________

Distance between waste source(s) and nearest surface water body (ft)?
150 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 20+ acres, if necessary

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe: None observed; bedrock was described as shales. Carbonaceous soils at SE NW S24, so there may be some present at this site.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None	Dry	180	36	Yes	Low
WR-2	None	Dry	765	725	Yes	Low
WR-3	None	Dry	675	640	Yes	Low
WR-4	None	Dry	3,150	3,150	No	None

Notes and Clarifications:

MDSL AMRB/PIONEER 4/9/93

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? "Private Land" sign posted.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_4_, types and locations: Adit associated with WR-1 in the bottom; pit associated with WR-2; and, two shafts up top associated with WR-3 and WR-4.

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lane, Prepared by Northern Engineering and Testing, August 16, 1988.

USGS, Topographic Map, Gipsy Lake, Montana, 7 1/2 minute Quadrangle, 1971.

LABORATORY ANALYTICAL DATA

LANE
PA NO. 30-019

Lane PA# 30−019
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 07/28/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30−019−WR−1	24 J	200 J	2.4 JX	4 J	4.6 J	164 J	11500	0.729 J	717 J	10 J	1110 J	21	419 J	NR
BACKGROUND	24 J	116 J	0.8 UX	5.2 J	12.2 J	20.2 J	13400	0.032 J	361 J	7 J	19 J	10 U	39 J	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30−019−WR−1	0.01	0.31	4.63	4.32	<0.01	0.01	<0.01	0.31	4.32

LEGEND

WR1 − Composite of subsamples WR3 and 4.
BACKGROUND − From the Lane (30−019−SS−1).

XRF ANALYSIS RESULTS

LANE
PA NO. 30-019

Mine Name: Lane PA# 30-019
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-019-SS-1		11866	10625.7	1325.72		649.362 *	20980		60.492 *	75.8752 *	43.8163 *	404.161
30-019-WR-1-COMP		27627	3362.36			1314.22	16956		211.358	668.868		295.007
30-019-WR-3		28553.3	4068.4			1241.62	17896.7		240.076	692.107		132.079
30-019-WR-4		21030.8	2275.89			845.738 *	18380.4		265.747	766.825		380.226

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-019-SS-1	150.521				130.208			683.347		11.2712 *	9.50803 *
30-019-WR-1-COMP	78.4759		26.9839	938.478	86.9897		65.8772 *	458.244	86.9243 *		17.5709 *
30-019-WR-3	88.6798		49.9411	690.081	92.8393		55.5123 *	668.819			14.1073 *
30-019-WR-4	48.9729		21.7877	1214.2	54.6607			334.215		11.7293 *	9.4063 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

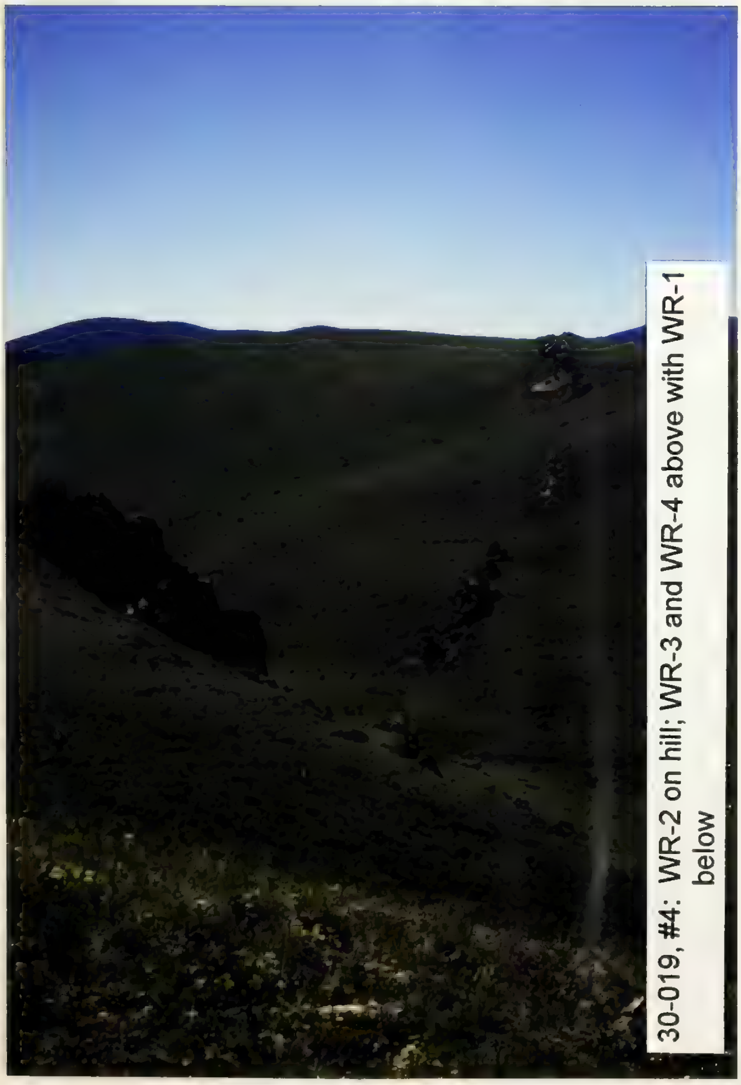
LANE
PA NO. 30-019

AIMSS SCORESHEET

SITE NAME: LANE
PA NUMBER: 30-019

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.332
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		7
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	7.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	930
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.366
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	3
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	44
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.012
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	6
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.011
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.01**

				SITE NAME:	LANE
				PA NUMBER:	30-019
LINE NO.		**SITE SAFETY**			
1	THREAT	ACCESSIBILITY			10
2		OPEN SHAFTS	100 EA.		0
3		OPEN ADITS	50 EA.		200
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.		0
5		HAZ. STRUCTURES	40 EA.		0
6		EXPLOSIVES			0
7		HAZ. MATERIALS			0
8		HAZARDS SCORE	SUM LINES 2 THRU 7		200
9		POPULATION - 1 MILE			0
10	TARGETS	NEAREST RESIDENCE			0
11		RECREATIONAL USE			0
12		TARGETS SCORE	SUM LINES 9 THRU 11		0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000		**0.00**



30-019, #4: WR-2 on hill; WR-3 and WR-4 above with WR-1 below

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BIGLER **PA#:** 30-067

Date: July 28, 1993 **Time:** 0830-1030

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; 50°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #23: Loadout, looking north; #24: Adit #2 discharge, GW-1 sample location; #25: Small ball mill at left and TP-1 at right of picture; #26: Loadout, tanks and barrels; #27: Drums of lube oil and waste oil; #28: Shaft and Adit #1 east of main workings; #29: Adit #3 discharge, GW-2 sample location. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: One 55 gal. drum of waste oil; two 5 gal. buckets of lube oil; possible explosives in locked core shed; many empty explosives crates in the vicinity.

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate waste rock and tailings.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BIGLER PA#: 30-067

Legal Description: T 9N ;R 4E ;Sec. 28 , NE1/4 SW1/4 ___1/4

County: MEAGHER Mining District: BEAVER CREEK

Latitude: N 46° 15' 30" Longitude: W 111° 15' 30"

Primary Drainage Basin and Code: Thompson Gulch/10030103
Secondary Drainage Basin: Thompson Gulch

USGS Quadrangle map name(s): Gipsy Lake

Mine Type/Commodities: Hardrock/Gold, Silver, Copper

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Helena National Forest.

Relationship to other mines/sites in the area/district: Appears to have been operated by the same individuals that operate the nearby Porcupine mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7450' , Slope 10° ,
Aspect East-northeast

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify) Logging

Area of disturbed/unvegetated lands? Approx. 3 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Very close to the Porcupine mine on the same road

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies well above the headwaters of Thompson Gulch (1/3 mile) and to the southwest. Water leaving the site would flow northeast. The area is underlain by Precambrian Belt series rocks; dikes stocks and sills of granitic rock intrude the sediments.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes X , No____, # 1 , Comment Open
Adits - Yes X , No____, # 3 , Comment____
Pits - Yes____, No X , # ____, Comment____
Placers - Yes____, No X , # ____, Comment____
Other - Yes____, No X , # ____, Comment____

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: Small mill has operated recently, in the late 1980s.

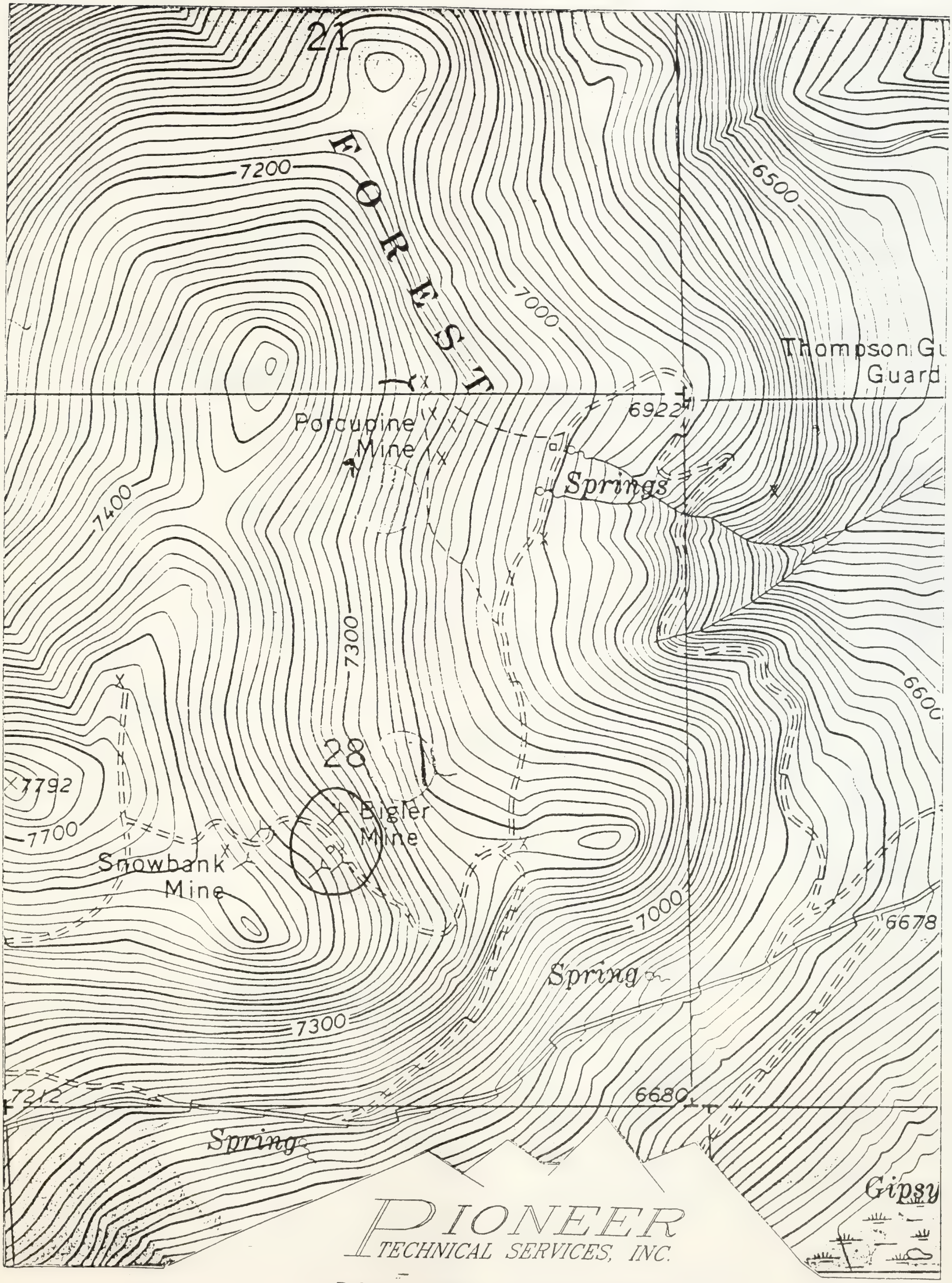
Origin of Ore Milled - Custom Mill____ Dedicated Mill X ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Floatation/gravity

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123284	09N 04E 22 CDD	78.0	0.0	0.00
M:123287	09N 04E 22 CDD	42.0	0.0	0.00

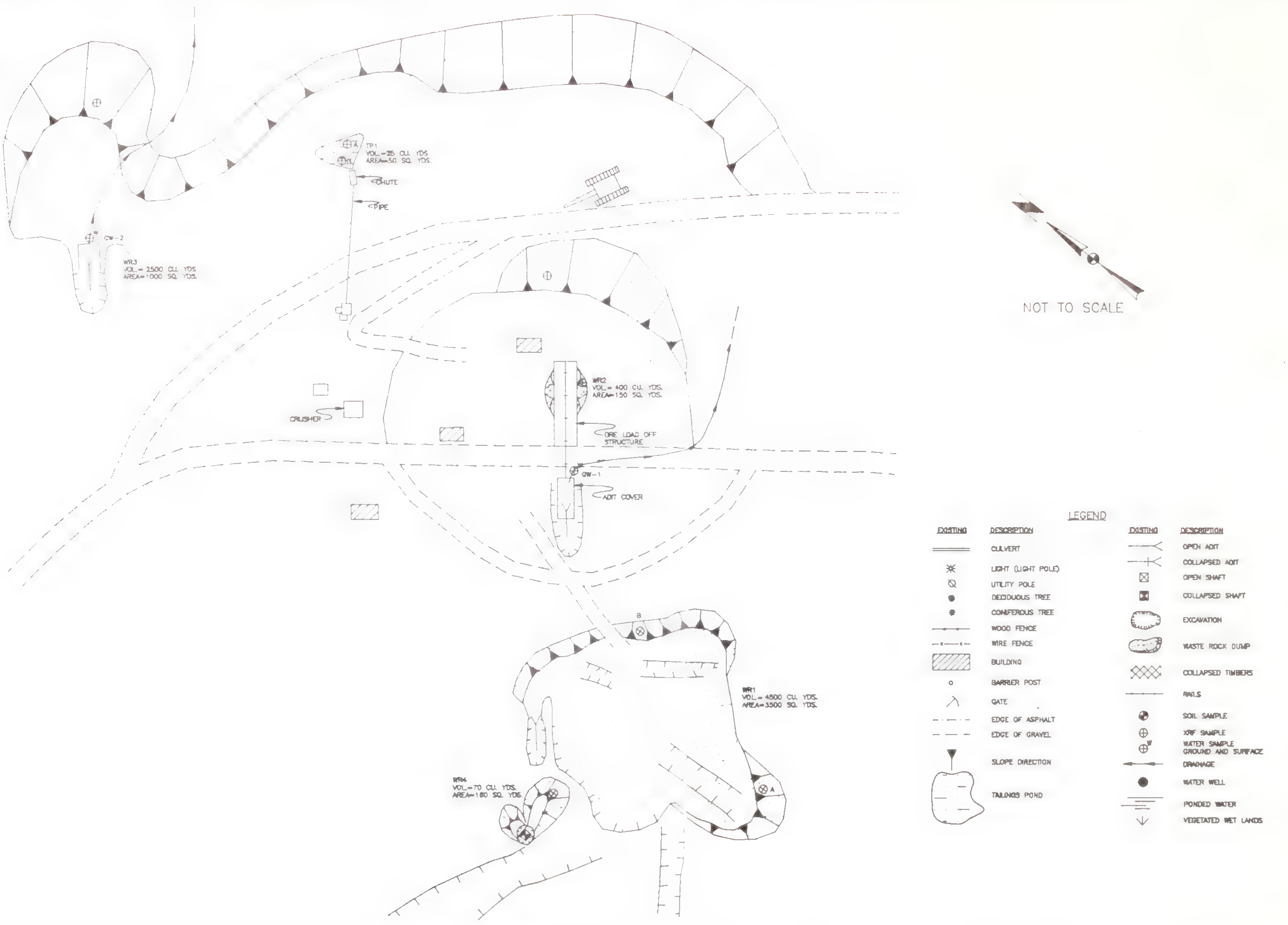


PIONEER
TECHNICAL SERVICES, INC.

BIGLER MINE, P.A. NO. 30-067

T09N, R04E, SECTION 28

SCALE: 1" = 1000'



DRAWN JTP DATE 8 NOV 93
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MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BIGLER PA# 30-067
BEAVER CREEK DISTRICT MEAGHER COUNTY

SHEET NO.

30-067.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): 80% coarse to medium sand; 20% silty/fine sand

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Tailings impoundment is approx. 1.5 feet deep with no clear stratification.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Tailings are moist throughout from recent precipitation.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Impoundment is intact and in excellent condition; very small impoundment.

Comments on potential for mitigation: Encapsulate or amend and revegetate

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	4,500	Dump associated with Adit #1; brown/orange sand	None	6.8 (D)	0.05	30-067-WR-1	07/28/93 1843	T-Metals, ABA
WR-1B	WR		Dump associated with Adit #1; brown/orange sand	None	6.9 (D)	0.04			
WR-2A	WR	400	Dump associated with Adit #2, below loadout	None	7.0 (D)	0.05			
WR-3A	WR	2,500	Dump associated with Adit #3	None	7.0 (D)	0.07	N/A	N/A	XRF Analysis
WR-4A	WR	70	Dump associated with shaft; brown loam	None	6.6 (D)	0.05			
TP-1A	TAIL	25	East side; 0'-1.5', brown sand	Berm	6.6 (D)	0.04	30-067-TP-1	07/28/93 1850	T-Metals, ABA
TP-1B	TAIL		West side; 0'-1.4', brown silty sand	Berm	5.8 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-067-WR-1 is composite of WR-1A and -1B, WR-2A, and WR-4A. 30-067-TP-1 is composite of TP-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o topographic map.

Flowing adits: Yes X , No___, Number: 2 Identification: Adit #2 and Adit #3

Filled shafts: Yes___, No X , Number:____ Identification:________

Seeps/Springs: Yes___, No X , Number:____ Identification:________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 8

Distance to nearest well used for drinking? USFS campground approx. 1 mile from the site.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Shallow groundwater present on the site; metal values are elevated in small dumps.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #2	15 gpm (E)	8.54	160	199	4.4	55	N/A	30-067-GW-1	07/28/93 0940	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Adit #3	45 gpm (M)	8.55	160	270	4.3	62	N/A	30-067-GW-2	07/28/93 1000	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No___, Name(s)/Description: Discharge from Adit #3 flows off of site toward drainage approx. 1/3 mile below the site.

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
Approx. 1/3 mile

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Adit #3 discharge flows over WR-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agricultural, irrigation, fishery, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Many acres of moderately sloping (10°) forest land between discharges and stream drainage below the site.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: High pH; soils indicate presence of carbonates.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approximately 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None	Dry	31,500	31,500	No	None
WR-2	None	Dry	1,350	1,350	No	None
WR-3	None	Dry	9,000	8,100	No	None
WR-4	None	Dry	1,440	1,440	No	None
TP-1	None	Moist	450	360	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment Adits have doors

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations: Adit #2, Adit #3, and Shaft #1 (shallow)

Hazardous structures: Yes_X_, No___, Number_4_, types and locations: Loadout, shacks, and crusher

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Possible; explosives storage in a locked core/tool shed.

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Bigler, Prepared by Chen-Northern, August 15, 1989.

USGS, Topographic Map, Gipsy Lake, Montana, 7 1/2 minute Quadrangle, 1971.

LABORATORY ANALYTICAL DATA

BIGLER
PA NO. 30-067

Bigler PA# 30-067
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/28/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30-067-TP-1	10 J	88.8 J	2.4 JX	11.7 J	13.7 J	1020 J	66400	0.05 J	987 J	25 J	42 J	7 U	52 J	NR
30-067-WR-1	5 J	60.7 J	0.9 JX	10.5 J	9.8 J	262 J	24900	0.029 J	634 J	11 J	31 J	5 U	50 J	NR
BACKGROUND	24 J	116 J	0.8 UX	5.2 J	12.2 J	20.2 J	13400	0.032 J	361 J	7 J	19 J	10 U	39 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-067-TP-1	0.37	11.6	42.3	30.7	0.37	<0.01	<0.01	0.00	42.3
30-067-WR-1	0.07	2.19	10.5	8.36	0.07	<0.01	<0.01	0.00	10.5
30-067-WR-1DUF	0.07	2.19	11.8	9.62	0.07	<0.01	<0.01	0.00	11.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
30-067-GW-1	1.69 U	2.27	2.57 U	9.7 U	6.83 U	4.37 J	34.4 J	0.074	4.08 U	12.7 U	1.55 U	30.7 U	14.9 JX	61.4
30-067-GW-2	1.69 U	3.3	2.57 U	9.7 U	6.83 U	3.77 J	20.7 J	0.048	4.08 U	12.7 U	1.55 U	30.7 U	7.57 UX	61.8

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-067-GW-1	104	< 5.0	9	0.28	NR
30-067-GW-2	103	< 5.0	< 5.0	0.63	NR

LEGEND

TP1 – Composite of subsamples TP1A and 1B.
WR1 – Composite of subsamples WR1A, 1B, 2A, and 4A.
BACKGROUND – From the Lane Mine (30-019-SS-1).
WR1DUP – Duplicate of the 30-067-WR-1 sample.

GW1 – Adit #2 discharge.
GW2 – Adit #3 discharge.

XRF ANALYSIS RESULTS

BIGLER
PA NO. 30-067

Mione Name: Bigler PA# 30-067
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-067-TP1-A		15550.1	19140.1	631.09		2531.13	72090		639.331	86.959 *	47.1571 *	745.216
30-067-TP1-B		18318.7	42684.7	1220.58		1731.85	69196.8		964.973	119.035 *		910.398
30-067-TP-1-COMP		17657.9	32597.2	1008.4		1331.59	81947.7	525.79 *	902.628	103.187 *	39.6169 *	753.95
30-067-WR1-A		16585.1	16223.7	1229.03		997.794 *	30220.2	287.549 *	269.572	113.47 *		299.769
30-067-WR1-B		14040.2	22248.5	1447.29		1548.89	38265.3	350.08 *	297.429	88.5349 *	37.3469 *	528.47
30-067-WR2-A		13647.9	10048.1	1312.36	202.066 *	2066.07	40195.5		422.956	59.3048 *	45.8529 *	1300.91
30-067-WR3-A		11258.3	38895.1	1220.53	156.623 *	1452.49	25960.8		54.1098 *	106.777 *	36.7265 *	677.775
30-067-WR3-A-DUP		13913.9	43593.1	1196.07		2005.22	26474.6	299.265 *	76.8651 *	69.6256 *	28.984 *	801.134
30-067-WR4-A		14576.4	25911	1520.43		1204.15	25644.9		233.423	90.8115 *	34.4811 *	730.325
30-067-WR-1-COMP		14628.6	20790.8	1503.61		1254.06	34719.1		280.43	96.5253 *	42.2988 *	665.588

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-067-TP1-A	82.8106		71.5868		107.589			435.751			20.3232 *
30-067-TP1-B	118.572		29.8717		121.165			381.811			16.3051 *
30-067-TP-1-COMP	100.475		58.2072	24.7078 *	110.756			441.375			15.8928 *
30-067-WR1-A	210.423		5.37623 *	45.4481 *	143.3			403.441	117.327 *	15.9921 *	19.915 *
30-067-WR1-B	206.58		12.9502 *	121.295	162.643 *			371.659		10.2288 *	16.918 *
30-067-WR2-A	227.233		5.7895 *		115.964			1731.1		17.1543 *	26.2285
30-067-WR3-A	182.009				78.5834			437.334		10.0749 *	12.8919 *
30-067-WR3-A-DUP	185.065				74.0911	140.192 *		474.516	96.1414 *	10.1325 *	11.3904 *
30-067-WR4-A	219.736		6.48878 *		126.781			321.938			18.1739 *
30-067-WR-1-COMP	224.575		7.4612 *		115.144			738.446		11.0631 *	23.1941

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BIGLER
PA NO. 30-067

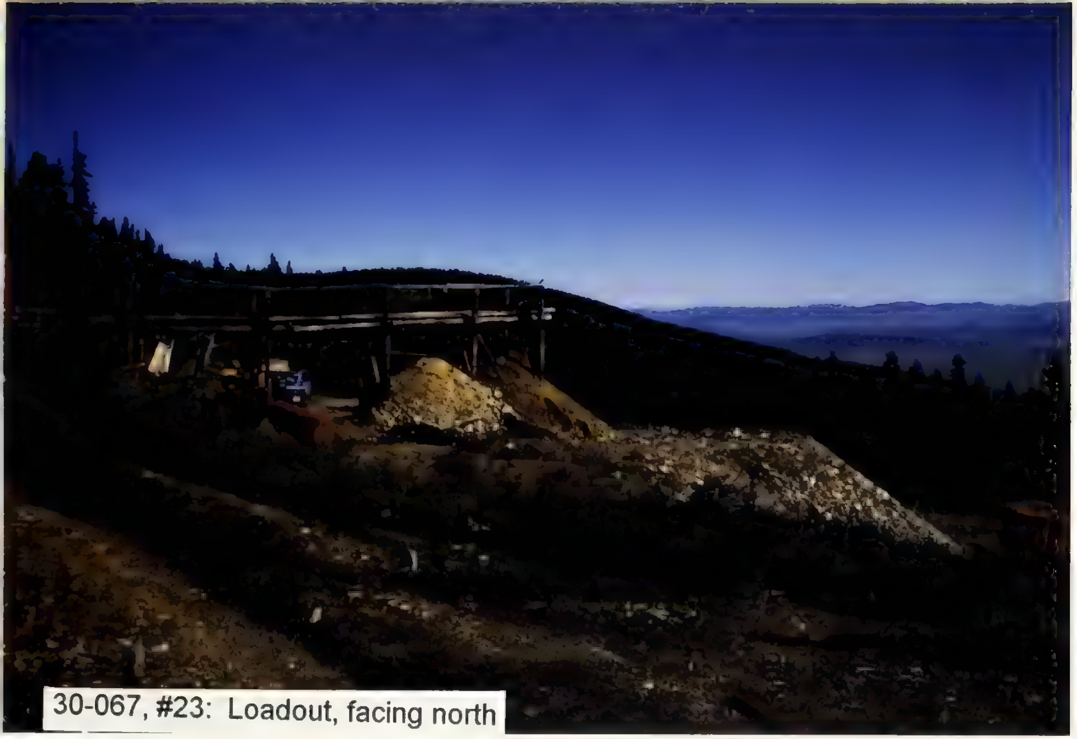
MDSL AMRB/PIONEER 4/9/93

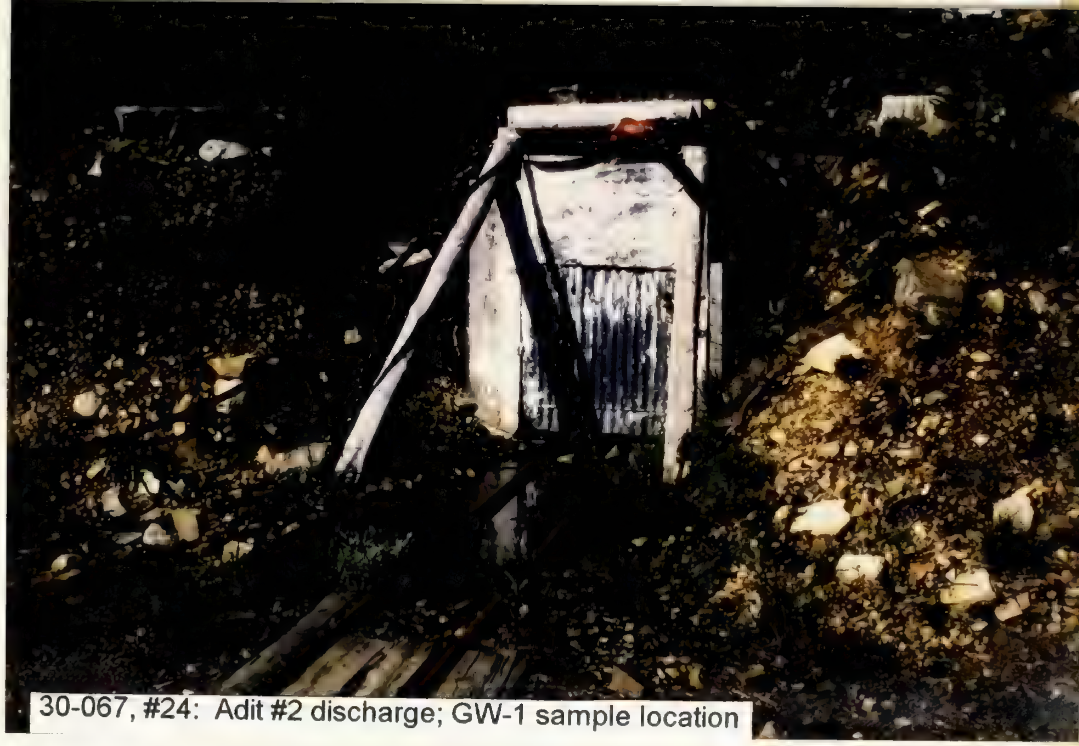
AIMSS SCORESHEET

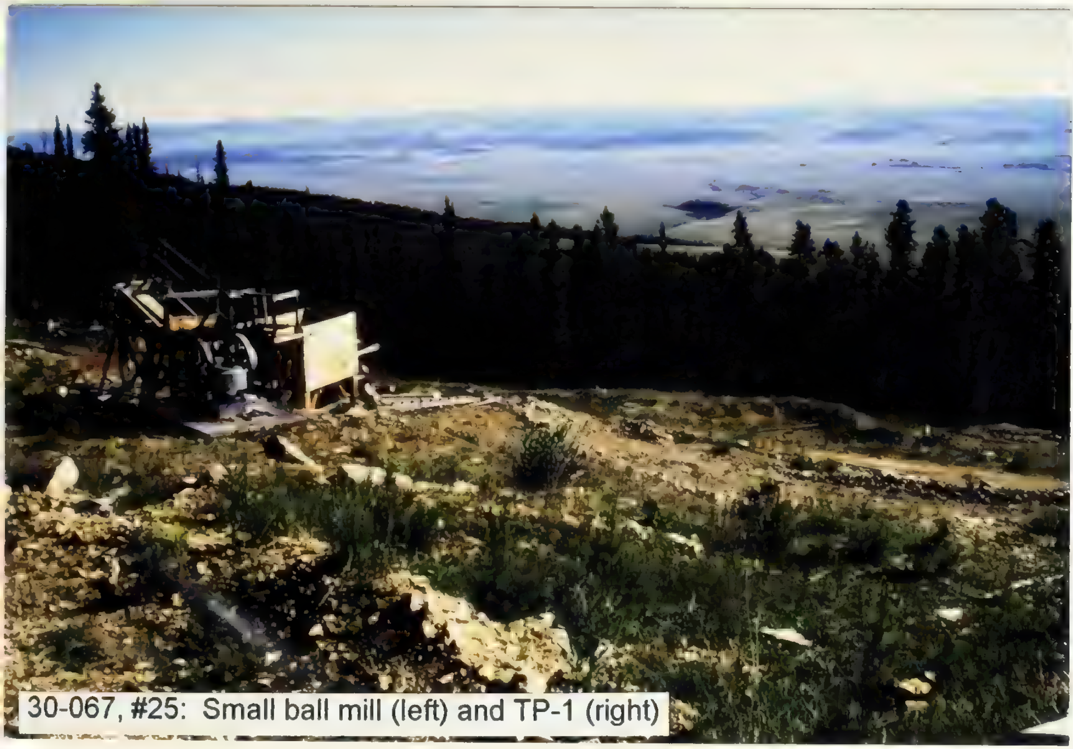
SITE NAME: BIGLER MINE
PA NUMBER: 30-067

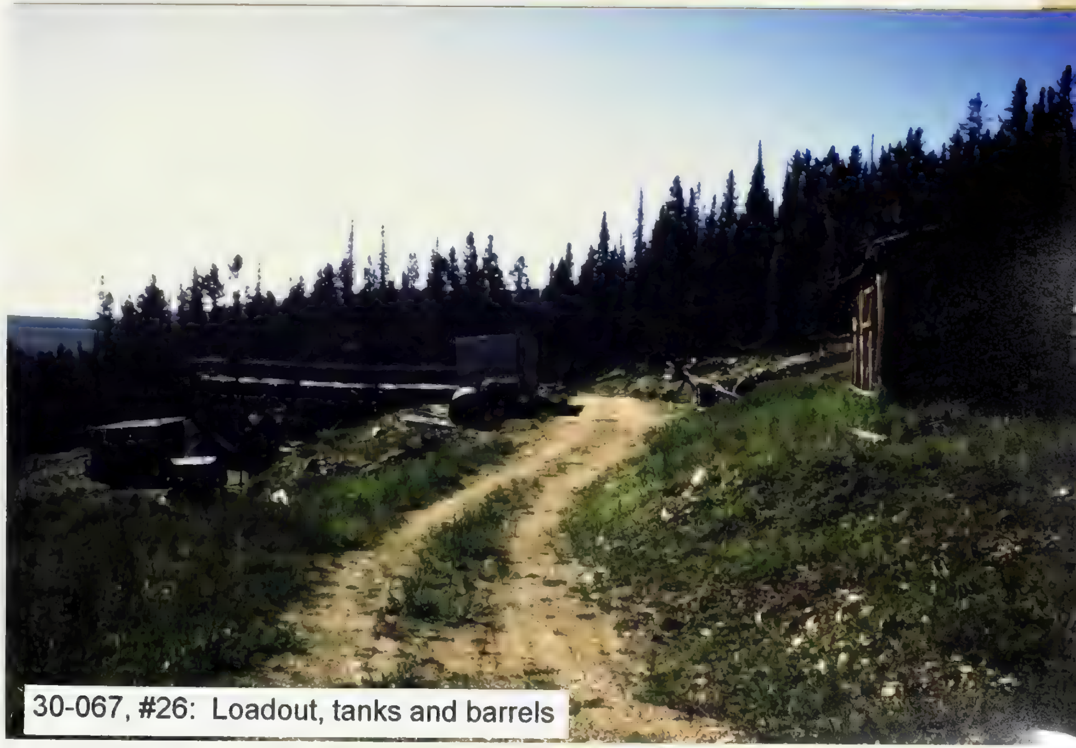
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.349
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		6
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	11.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	10336
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.395
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	8
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	766
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	3
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.11**

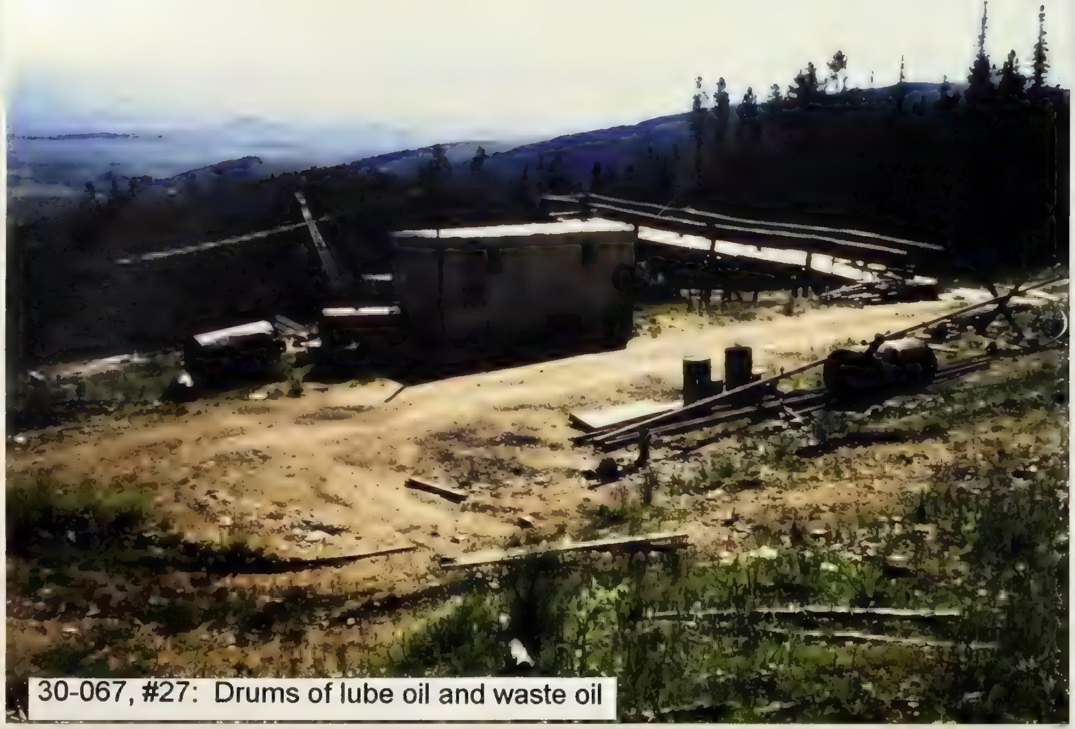
			SITE NAME:	BIGLER MINE
LINE NO.			PA NUMBER:	30-067
		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	510
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**20.40**

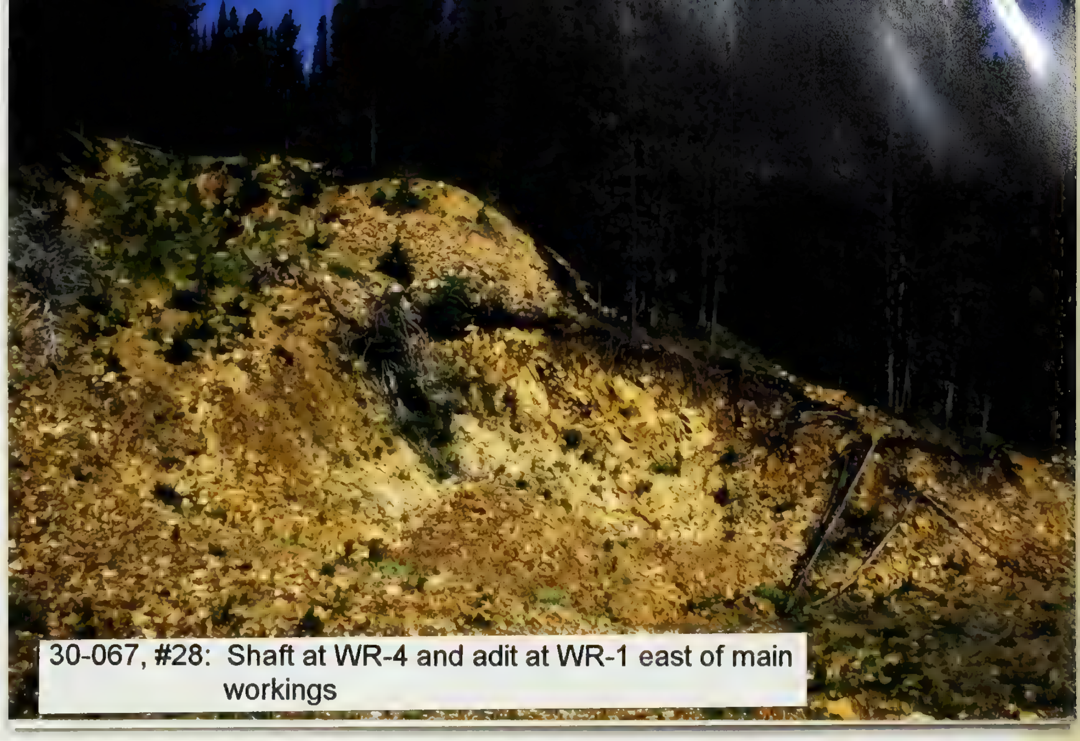

30-067, #23: Loadout, facing north

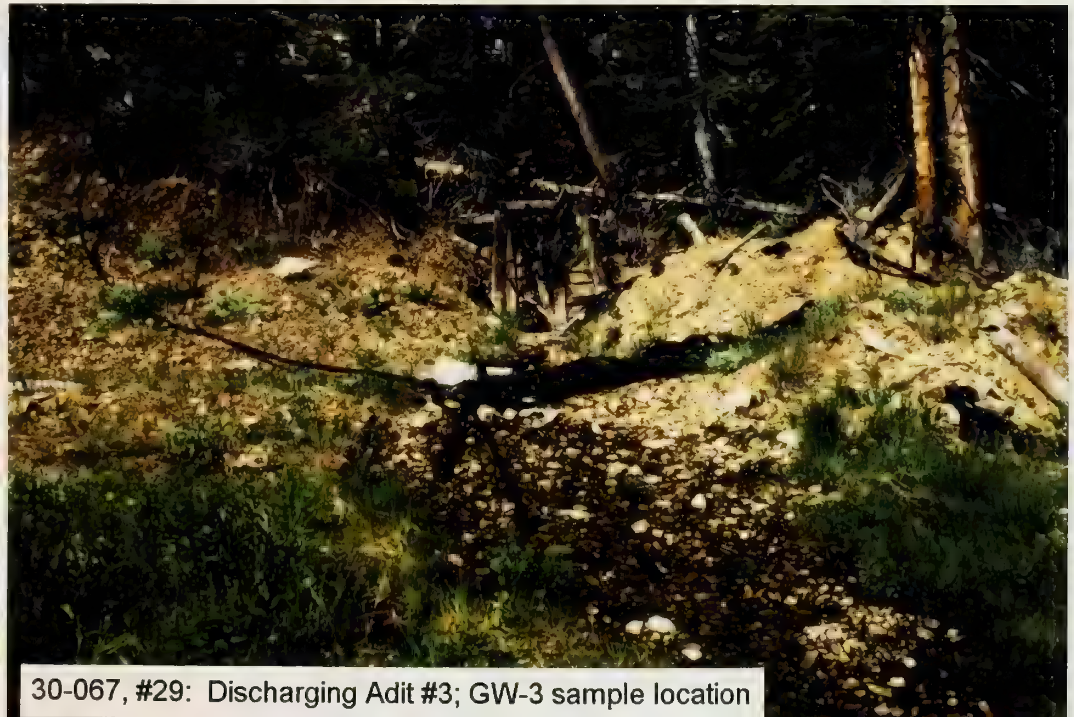

30-067, #24: Adit #2 discharge; GW-1 sample location


30-067, #25: Small ball mill (left) and TP-1 (right)


30-067, #26: Loadout, tanks and barrels


30-067, #27: Drums of lube oil and waste oil


30-067, #28: Shaft at WR-4 and adit at WR-1 east of main workings


30-067, #29: Discharging Adit #3; GW-3 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: PORCUPINE **PA#:** 30-069

Date: July 28, 1993 **Time:** 1100-1300

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; approx. 65°F.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #30: WR-1 and compressor shed; #31: Adit #1 and collapsed adit; #32: Stope adjacent to Adit #1; #33: WR-2; #34: Highwall and regraded WR-3 area; #35: WR-3. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Site does not have any water quality problems and would be easily revegetated. Grade (limited), amend, and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): PORCUPINE **PA#:** 30-069

Legal Description: T 9N ;R 4E ;Sec. 28 , NW1/4 NE1/4 ___1/4

County: MEAGHER **Mining District:** BEAVER CREEK

Latitude: N 40° 31' 05" **Longitude:** W 111° 13' 44"

Primary Drainage Basin and Code: Smith River/10030103
Secondary Drainage Basin: Thompson Gulch

USGS Quadrangle map name(s): Gipsy Lake

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active ___,Inactive/Exploration X ,Abandoned ___.

Ownership status: Known Y X N ___; private/public? Public
Owner, Agent, or Contact (Include address and phone when available): Helena National Forest.

Relationship to other mines/sites in the area/district: In close proximity to the Bigler mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Appears to be some grading in the WR-3 dump area.

General site features: Elevation 7220' , Slope 2°-10° ,
Aspect East

Land use: Mining X , Recreational X , Residential ___, Urban ___,
Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? 0.4 acres.
Dimensions: ___

Predominant vegetation types: Lodgepole pine and pine grass in undisturbed area; red fescue, poa, clover, lupine, and thistle on disturbed/regraded area.

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the east facing slope well above some springs that feed the perennial Thompson Gulch. Runoff from the site would flow east to the drainage. The site is underlain by Precambrian Belt Series rocks intruded by granite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X, # ____, Comment

Adits - Yes X, No___, # 2, Comment 1 open; 1 collapsed

Pits - Yes___, No X, # ____, Comment

Placers - Yes___, No X, # ____, Comment

Other - Yes X, No___, # 1, Comment Open stope

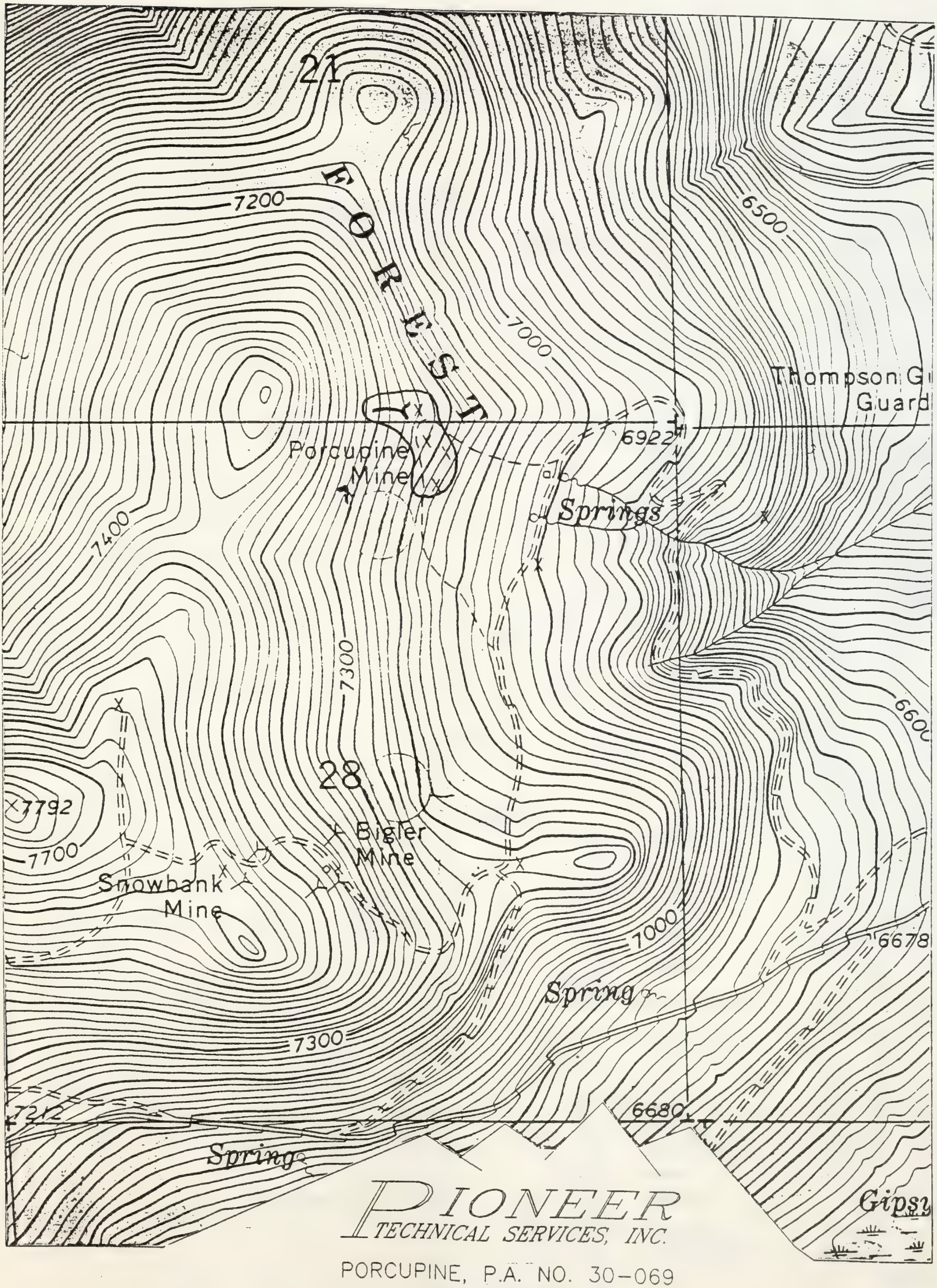
Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

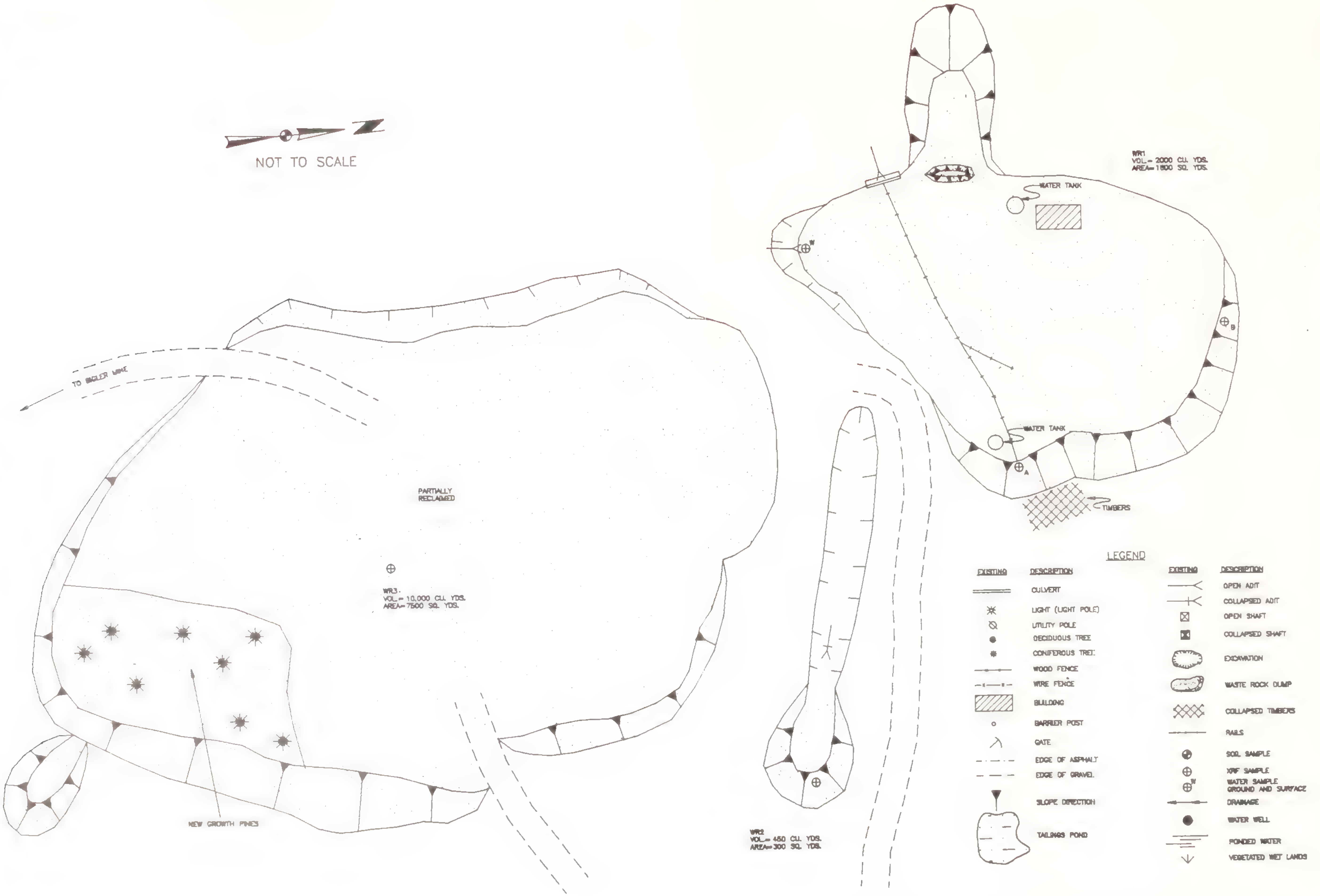
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? N/A

Well No.	Location	Depth	Yield	Static Water Level
M:123284	09N 04E 22 CDD	78.0	0.0	0.00
M:123287	09N 04E 22 CDD	42.0	0.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

PORCUPINE, P.A. NO. 30-069
T09N, R04E, SECTION 28
SCALE: 1" = 1000'



30-069.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
PORCUPINE PA# 30-069
BEAVER CREEK DISTRICT MEAGHER COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN JTP DATE 8 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,000	East end of WR-1 orange/brown coarse sand	None	7.0 (D)	0.06	30-069-WR-1	07/28/93	T-Metals, ABA
WR-1B	WR		East end of WR-1 brown coarse sand	None	7.0 (D)	0.055			
WR-2	WR	450	Small older dump between WR-1 and WR-3 orange/brown coarse sand	None	6.9 (D)	0.04	30-069-WR-2	07/28/93	T-Metals, ABA
WR-3	WR	10,000	Highwall area south of end of site tan sand	None	7.0 (D)	0.045			

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-069-WR-1 is composite of WR-1A and -1B. 30-069-WR-2 is composite of WR-2 and WR-3.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map oi topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes_X_, No___, Number:____ Identification: Ponded water in the stope, possibly precipitation ponding

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 8

Distance to nearest well used for drinking? 1.25 miles to USFS campground

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X_.
Workings are dry and non-reactive.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	GW	Water ponded in stope	0	7.2	70	269.4	5.3	33	N/A	N/A	N/A	N/A

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No analytical sample was collected due to normal field parameter values and a lack of receptors (i.e. drinking water wells, streams). Water appeared to be precipitation ponding in a shallow stope.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s): Over 1/2 mile to nearest intermittent stream

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
< 1/2 mile

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Very small erosion gullies in regraded area of WR-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 5 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe: None observed

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX; SO3	Dry	14,400	12,240	No	None
WR-2	FEOX	Dry	2,700	2,430	No	None
WR-3	None	Dry	67,500	47,250	No	None
GW-1	N/A	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None_

Evidence of recreational use on site: Yes_X_, No___, Describe:_______
Vehicle tracks and litter

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes_X_, No___, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:___
Stope and adit with door nailed shut

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Compressor shed

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_,
types and locations:_Highwall approx. 12' high does not appear
unstable.

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Porcupine, Prepared by Chen-Northern, August 14, 1989.

USGS, Topographic Map, Gipsy Lake, Montana, 7 1/2 minute Quadrangle, 1971.

LABORATORY ANALYTICAL DATA

PORCUPINE
PA NO. 30-069

Porcupine PA# 30-069
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/28/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30-069-WR-1	4 U	134 J	0.4 UX	4.8 J	3 J	238 J	22200	0.218 J	454 J	2 U	15 J	5 U	26 J	NR
30-069-WR-2	4 U	178 J	0.6 JX	4.3 J	1.6 J	6.9 J	11500	0.015 J	1150 J	3 J	26 J	5 U	45 J	NR
BACKGROUND	24 J	116 J	0.8 UX	5.2 J	12.2 J	20.2 J	13400	0.032 J	361 J	7 J	19 J	10 U	39 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-069-WR-1	0.02	0.62	4.11	3.48	0.02	<0.01	<0.01	0.00	4.11
30-069-WR-2	<0.01	0.00	5.27	5.27	<0.01	<0.01	<0.01	0.00	5.27

LEGEND

WR1 - Composite of subsamples WR1A and 1B.
WR2 - Composite of subsamples WR2A and 3A.
BACKGROUND - From the Lane Mine (30-019-SS-1).

XRF ANALYSIS RESULTS

PORCUPINE
PA NO. 30-069

Mine Name: Porcupine PA# 30-069
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-069-WR1-A		14178.8	6671.28	1000.6	157.101 *	706.491 *	41590		210.449	75.4602 *	43.9941 *	760.735
30-069-WR1-B		11512.7	11754.1	1173.65	158.185 *	1560.83	22231.8		147.49 *	75.4688 *	30.4659 *	1038.75
30-069-WR2-A		12983.1	10252.4	1212.03	194.988 *	2683.16	25963			89.4372 *	39.1586 *	1169.26
30-069-WR3-A		12668.6	12656.6	1264.2	157.192 *	1139.05	23642.4		52.1456 *	78.057 *	29.2343 *	1028.66
30-069-WR-1-COMP		16071.1	11751.4	1313.96		1002.09 *	36186.9		198.859	78.7034 *	31.5013 *	1025.26
30-069-WR-2-COMP		11392.1	11495.3	1207.66		1825.63	25813.2		54.6787 *	69.4223 *	34.8352 *	1126.09

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-069-WR1-A	135.231		5.56595 *		105.078			1249.97		21.2988 *	30.8566
30-069-WR1-B	173.684				100.047			1091.66		16.7418 *	25.6673
30-069-WR2-A	183.141				84.3779			1512.5		16.5999 *	18.6259 *
30-069-WR3-A	206.799				96.1617			1734.69	87.6254 *	23.1663 *	28.2932
30-069-WR-1-COMP	179.279				128.951			1487.41		19.2631 *	23.9745 *
30-069-WR-2-COMP	210.98				74.4438			1673.73		23.0561 *	25.3839

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

PORCUPINE
PA NO. 30-069

AIMSS SCORESHEET

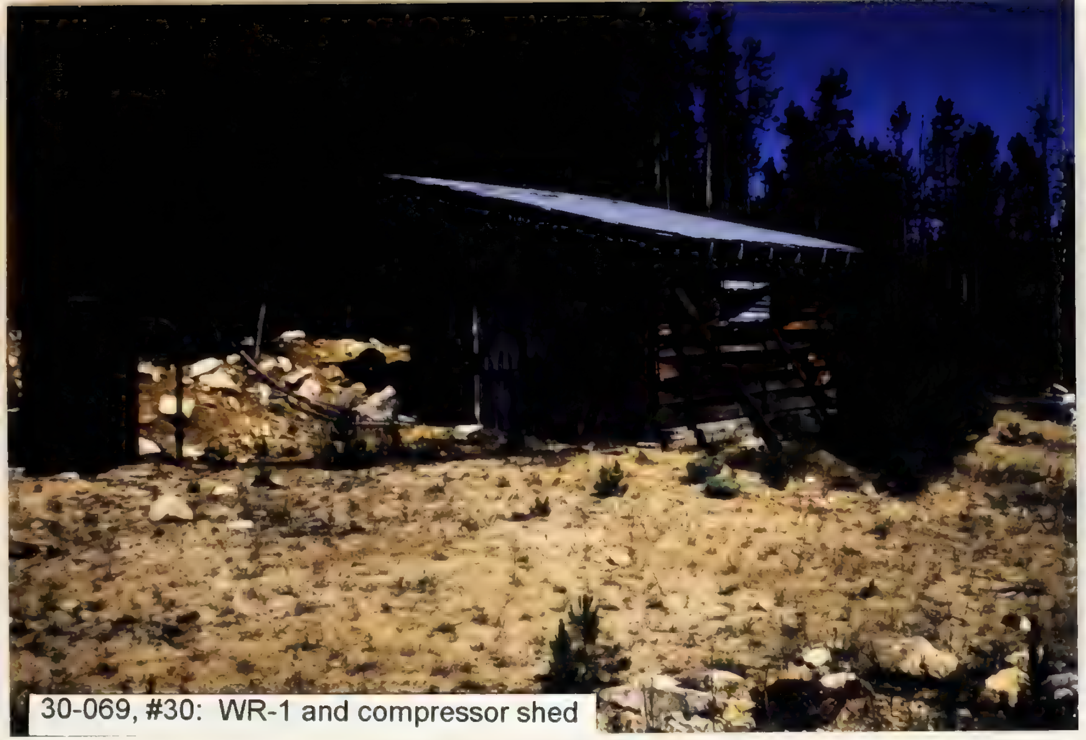
SITE NAME: PORCUPINE
PA NUMBER: 30-069

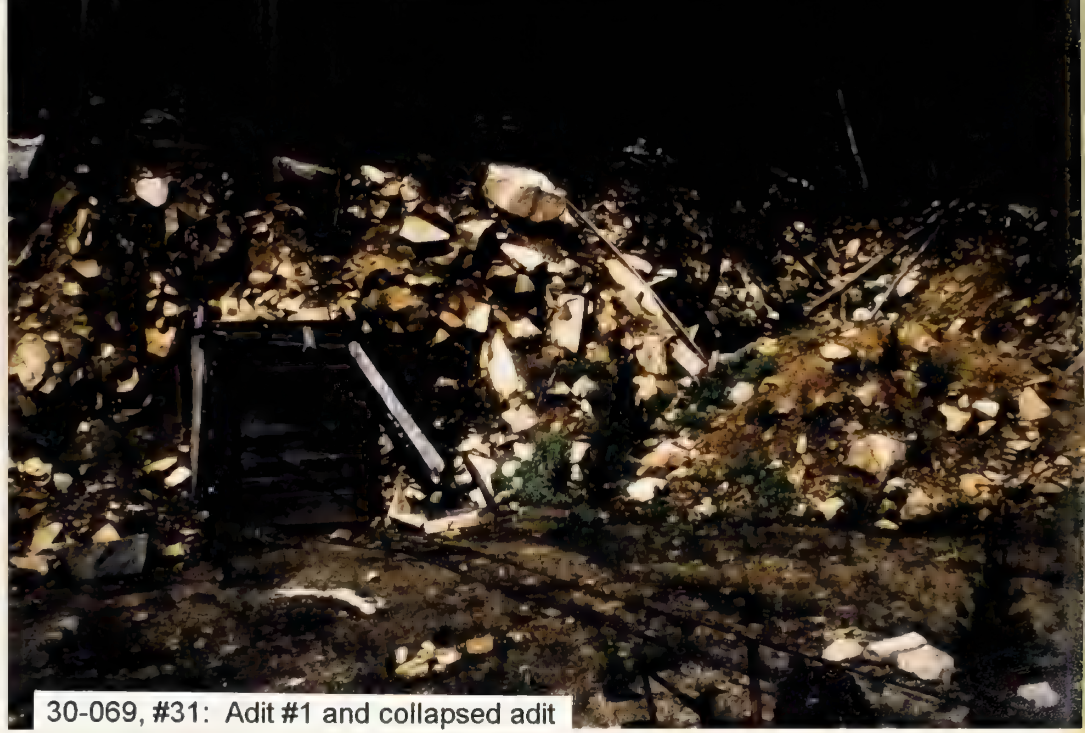
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.071
6		WELLS - 1 MI. x 2.5		5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		6
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	11.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	31
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.089
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19	SW - TARGETS	FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	3
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	11
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

SITE NAME: PORCUPINE
PA NUMBER: 30-069

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	265
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**10.60**


30-069, #30: WR-1 and compressor shed


30-069, #31: Adit #1 and collapsed adit

30-069, #32: Stope adjacent to Adit #1

30-069, #33: WR-2

30-069, #34: Highwall and regraded WR-3 area

30-069, #35: WR-3

CASTLE MOUNTAIN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: CUMBERLAND **PA#:** 30-004

Date: July 29, 1993 **Time:** 1330

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: Sightseers

Weather/Seasonality Observations: Partly cloudy; warm (80°F); windy later in afternoon (20-25 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #6: Headframe at Shaft #2; #7: Slag pile, adit, WR-4, facing west; #8: WR at Shaft #1, facing northeast. Video Tape No. 1.

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Site accessed by truck. Upper workings must be hiked to from lower smelter area.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove slag, recontour, coversoil, and revegetate (or reprocess for lead and zinc) waste rock.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CUMBERLAND PA#: 30-004

Legal Description: T 8N ;R 8E ;Sec. 14 , NE1/4 SE1/4 ___1/4

County: MEAGHER Mining District: CASTLE MOUNTAIN

Latitude: N 46° 27' 08" Longitude: W 110° 40' 57"

Primary Drainage Basin and Code: Alabaugh Creek/10040201
Secondary Drainage Basin: Castle Creek

USGS Quadrangle map name(s): Castle Town

Mine Type/Commodities: Hardrock/Lead, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Mary Ann Manger, P.O. Box 5567, Helena, MT 59604.

Relationship to other mines/sites in the area/district: Near Belle of the Castle, Hamilton, and Yellowstone mines

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Some fencing has been done by MDSL.

General site features: Elevation 6400' , Slope 18° ,
Aspect East

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 2 acres.
Dimensions:

Predominant vegetation types: Grasses, strawberries, lupine, black-eyed susans, paint brush

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). On same access road as the Belle of the Castle mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on perennial Castle Creek, which flows east and then south past the site. Castle Creek flows into perennial Alabaugh Creek approx. 2 miles below the site. The lead-silver ore is found mainly in the Madison limestone either at contact with granitic intrusives or in fractures in limestone associated with intrusives.

Mining/milling history, ore type/tenor, host rock, gangue: In 1891, Cumberland was largest producer of Pb in the state. Mining began in 1886 with some development work from 1943 to 1959. The mine reopened in 1959 with a small production, 25-50 tons/month. Ore averaged 19.6% Pb and 6 oz Ag/ton. Total production was estimated at 18-20 million lbs. of Pb and 620,000 oz Ag. Chief gangue minerals are Fe oxides, jasper and limestone. Ore minerals are argentiferous galena, sphalerite, smithsonite, Au, and Cu. Ore Pb and Ag are found mainly in Madison limestone.

Mine Operation?

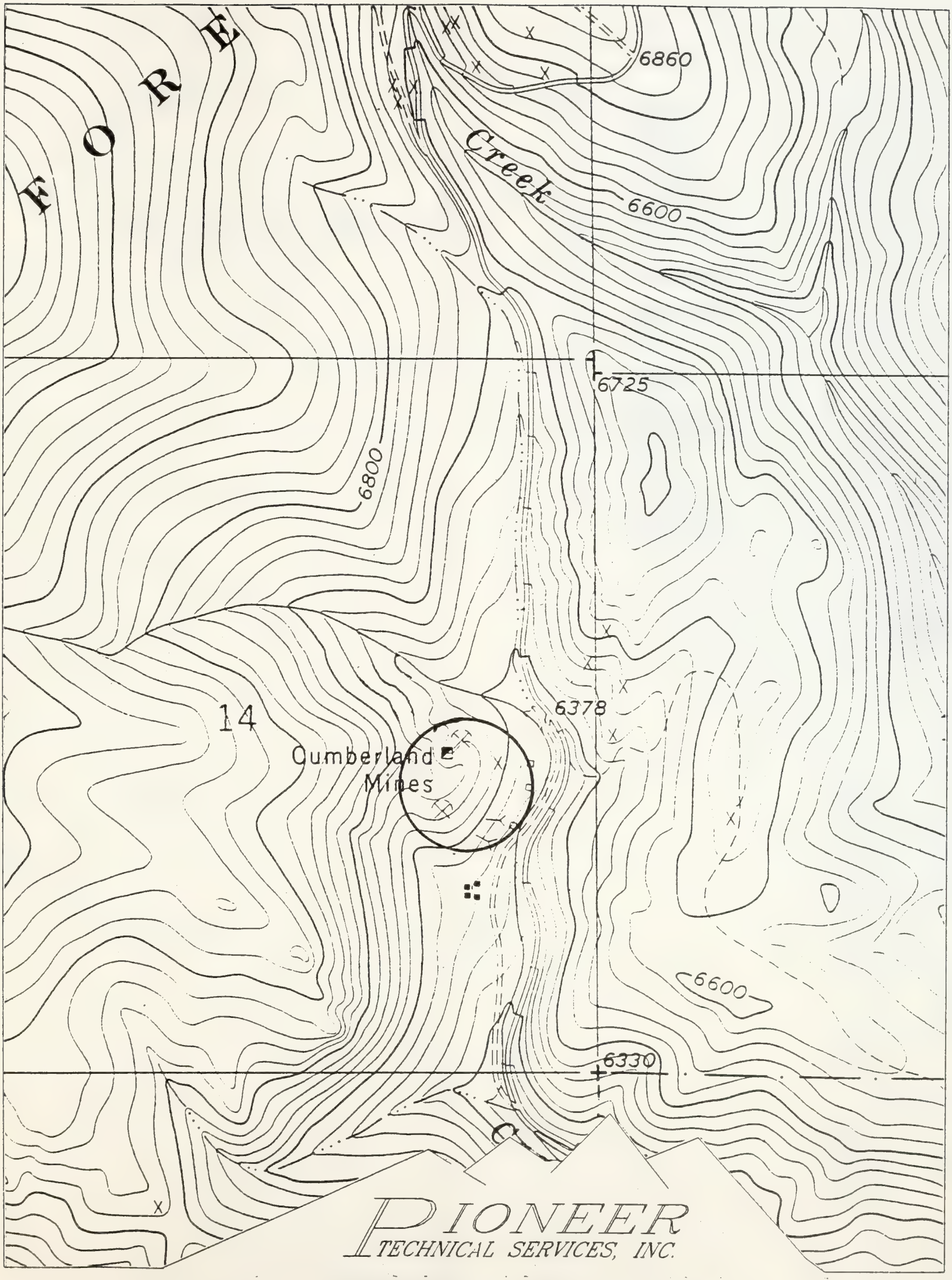
Shafts -	**Yes** X	**No**	**#** 3	**Comment** 1 collapsed; 1 fenced; 1 covered by boulders
Adits -	**Yes** X	**No**	**#** 1	**Comment**
Pits -	**Yes**	**No** X	**#**	**Comment**
Placers -	**Yes**	**No** X	**#**	**Comment**
Other -	**Yes**	**No** X	**#**	**Comment**

Mill Operation? **Yes** X, **No** ___. **If yes answer the next three questions:**

Period(s) of Operation: A smelter operation occurred from 1888 to 1892.

Origin of Ore Milled - Custom Mill ___ **Dedicated Mill** ___; **Number and names of mines that supplied mill feed:** Sheltered ore from Cumberland and other lead-silver mines in the district.

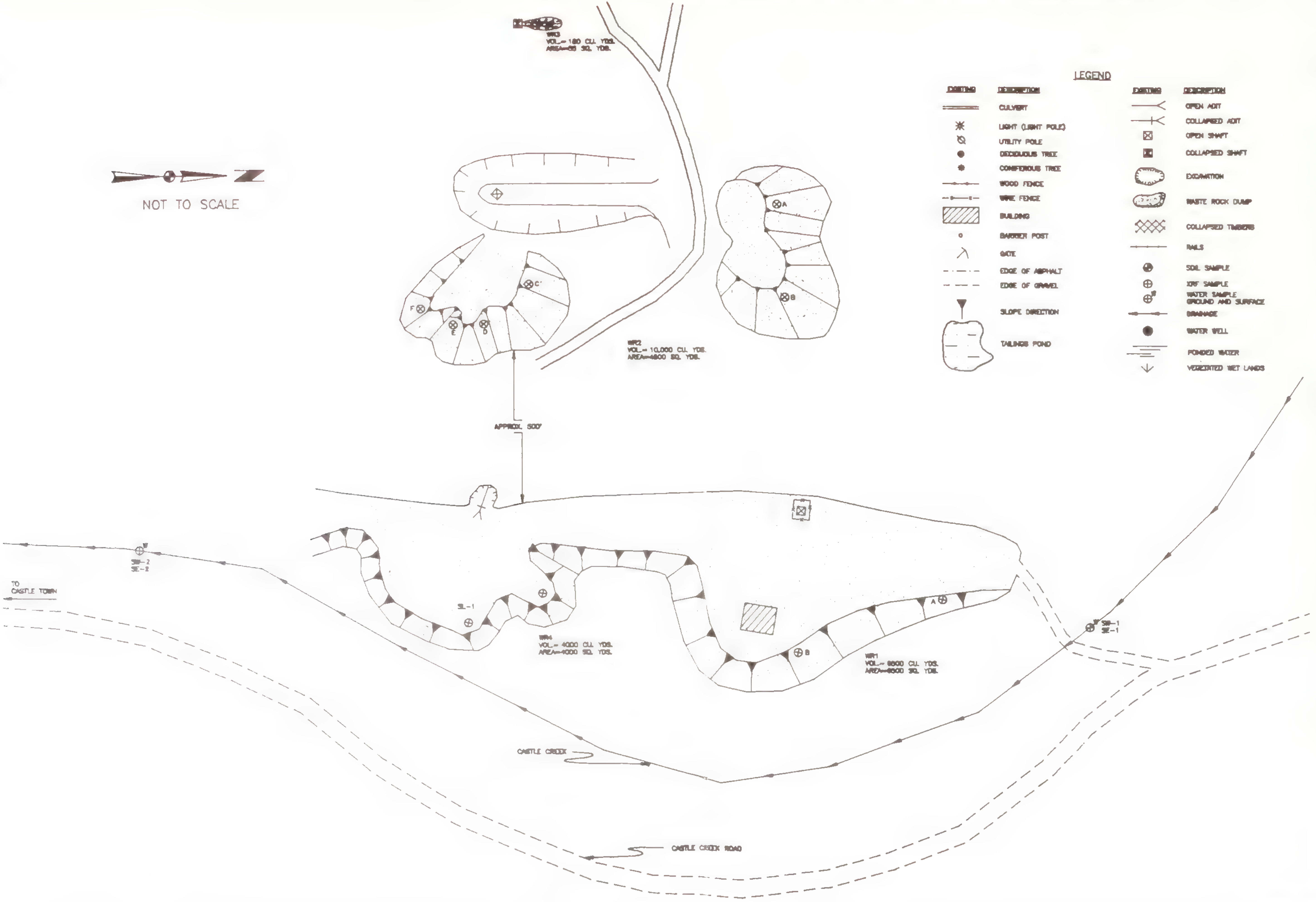
Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting? Smelting; 13,000 tons of ore smelted from May 1891 to March 1892. Lead slag from smelter dump shipped in 1924-1926. 10 ton/day plant. Some ore roasted before smelting.



PIONEER
TECHNICAL SERVICES, INC.

CUMBERLAND, P.A. NO. 30-004

T08N, R08E, SECTION 14
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

CUMBERLAND PA# 30-004
CASTLE MOUNTAIN DISTRICT MEAGHER COUNTY

PIONEER

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN JTP DATE 10 NOV 93
DESIGNED TPR JOB NO 93-17
APPROVED WJB F.B. NO.

SHEET NO.

30-004.DWG SHEETS
]

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	6,500	At pile near road entrance	None	< 3.5 (D)	0.04	30-004-WR-2	07/29/93 2210	T-Metals, ABA
WR-1B	WR		On flat area near open building	None	< 3.5 (D)	0.04			
WR-2A	WR	10,000	North of pit, approx. 5′ from top on north side	None	6.4 (D)	0.04	30-004-WR-1	07/29/93 220	T-Metals, ABA
WR-2B	WR		East of pit, on north edge of lobe, 5′ from top	None	6.6 (D)	0.03			
WR-2C	WR		East of pit, on north edge of lobe, 5′ from top	None	6.7 (D)	0.04			
WR-2D	WR		East of pit, east slope of first lobe from north, off knob 3	None	6.3 (D)	0.04			
WR-2E	WR		East of pit, east facing knob third from north, 5′ from top	None	6.4 (D)	0.04			
WR-2F	WR		East of pit, on southern most lobe on east side of WR	None	6.2 (D)	0.05			
WR-3	WR	180	Small pile east of pit, east side of pile near nose, 3′ from top	None	6.8 (D)	0.04			
WR-4	WR	4,000	On north side of slag	None	5.5 (D)	0.05			
SL-1	SLAG	Small	Near middle of pile	None	7.0 (D)	0.05	30-004-SL-1	07/29/93 2150	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-004-WR-1 is composite of WR-2A through -2F. 30-004-WR-2 is composite of WR-1A and -1B, WR-3, and WR-4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 3

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Limestone abundant in area, though waste rock contains highly elevate
metal values and is partially present in floodplain.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Castle Creek

Dry streambeds: Yes ____, No X, Name(s):

Other surface water: Yes ____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): Slag

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.7 during investigation
High Flow: 10 cfs, Average Flow: 1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 60 feet between slag and Castle Creek.

Surface water draining onto or through waste sources: Yes ____, No X,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery, irrigation, wetland, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X, Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient in Castle Creek, approx. 100' from site	8.14	130	NM	NM	56	0.7 cfs (M)	30-004-SW-1	07/29/93 1415	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient in Castle Creek, approx. 100' from site	N/A	N/A	N/A	N/A	N/A	N/A	30-004-SE-1	07/29/93 1415	T-Metals
SW-2	SW	50' downgradient of slag pile in Castle Creek	8.13	130	NM	NM	58	0.7 cfs (M)	30-004-SW-2	07/29/93 1345	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	50' downgradient of slag pile in Castle Creek	N/A	N/A	N/A	N/A	N/A	N/A	30-004-SE-2	07/29/93 1345	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to malfunction.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Limestone is host rock for mineralization; limestone is present as float in all dumps. Soils are also carbonaceous.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	pH	Dry	58,500	29,250	Yes	Moderate/Low
WR-2A	FEOX	Dry	10,125	7,594	Yes	Low
WR-2B	None	Dry	10,125	5,063	Yes	Low
WR-2C - 2F	SO3	Dry	20,250	16,200	Yes	Low
WR-3	SO3	Dry	495	248	Yes	Low
WR-4	None	Dry	36,000	28,800	Yes	Moderate/Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe:
Sightseeing area

Accessibility - Fences, warning signs, closed roads? Fences around Shaft #1; no road to upper workings, otherwise easily accessible.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment
Wilderness Area - Yes___, No_X_, Comment
T&E Species Habitat - Yes___, No_X_, Comment
Bat Habitat - Yes___, No_X_, Comment

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:
Shaft #1 is fenced, but open; Shaft #2 has openings between boulders, uncertain as to stability of boulders or depth of openings beneath.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:
Headframe on Shaft #2

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_,
types and locations: Pit on upper workings has unstable highwalls; pit walls are approx. 75' deep up to 30' high (3 terraces to base).

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:

Fire and/or Explosion hazards: Yes___, No_X_, Explain:

Bibliography

MBMG, Mineral and Industry File 90.0, Cumberland Mine, Meagher County, Montana.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Cumberland, Prepared by Chen-Northern, August 10, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Cumberland, Prepared by Daphne Digrindakis, June 27, 1984.

MDSL/AMRB Files, Montana Mining Prospect (Castle Mining District and the Cumberland Mine), Typewritten Report of the Original by D.D. Turberville, May 1965.

MDSL/AMRB Files, Supplemental Report on the Cumberland Mine at Castle, Montana, Written by William Rogers Wade, Consulting Mining Engineer, March 21, 1964.

USBM, Mines and Mineral Deposits (Except Fuels), Meagher County, Montana, Information Circular No. 7540, Written by Robert N. Roby, January 1950.

USGS, Topographic Map, Castle Town, Montana, 7 1/2 minute Quadrangle, 1972.

LABORATORY ANALYTICAL DATA

CUMBERLAND
PA NO. 30-004

Cumberland PA# 30-004
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/29/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30-004-SE-1	37 J	136 J	1.9 JX	6.6 J	11.9 J	15.5 J	13300	0.083 J	924 J	11 J	409 J	7 U	108 J	NR
30-004-SE-2	61 J	191 J	2 JX	7.2 J	21.5 J	28.7 J	19200	0.106 J	975 J	17 J	1130 J	10 U	265 J	NR
30-004-SL-1	861 J	406 J	7.8 JX	6.2 J	11.6 J	298 J	143000	0.009 UJ	4740 J	3 J	25900 J	36	13000 J	NR
30-004-WR-1	542 J	48.4 J	9.6 JX	3.4 J	13.1 J	133 J	22800	0.191 J	566 J	12 J	52500 J	40	990 J	NR
30-004-WR-2	574 J	58.4 J	7.2 JX	2.1 U	9.6 J	160 J	34600	0.196 J	1480 J	5 J	15200 J	22	2000 J	NR
BACKGROUND	63	154 J	2.2	21.9 J	21.4	396 J	46600	0.062 J	878	21 J	52 J	6 U	135 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-004-SL-1	1.62	50.6	150	99.0	<0.01	<0.01	3.33	0.00	150
30-004-WR-1	0.21	6.56	578	572	<0.01	0.17	0.39	5.31	573
30-004-WR-2	2.02	63.1	419	356	<0.01	1.55	1.53	48.4	370

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
30-004-SW-1	3.69	19	2.57 U	9.7 U	6.83 U	1.55 U	60.1 J	0.097	4.08 U	12.7 U	1.14 J	30.7 U	7.57 U	40.2
30-004-SW-2	3.77	24.8	2.57 U	9.7 U	6.83 U	1.55 U	178 J	0.11	16.1	12.7 U	6.5 J	30.7 U	7.57 U	53.1

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-004-SW-1	79	< 5.0	5	< 0.05	NR
30-004-SW-2	92	< 5.0	< 5	0.08	NR

LEGEND

SE1 – Upgradient (approx. 100' from site) in Castle Creek.
SE2 – 50 feet downgradient of slag pile in Castle Creek.
SL1 – Small waste rock pile near middle.
WR1 – Composite of subsamples WR2A, 2B, 2C, 2D, 2E, and 2F.
WR2 – Composite of subsamples WWR1A, 1B, 3, and 4.
BACKGROUND – From the Belle of the Castles (30-007-SS-1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

CUMBERLAND
PA NO. 30-004

Mine Name: Cumberland PA# 30-004
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-004-SL-1		5995.91	98903.6	788.559		5701.67	157052		337.796 *	9553.58		274.542
30-004-WR1-A		5636.54	47275.3	489.086		2632.6	151397	1285.31 *	425.349	6834.89		70.9047
30-004-WR1-B		10912.3	98715	1371.39		1358.93 *	66685.1		249.917 *	5166.98	398.659 *	178.165
30-004-WR2-A		13008.9	133039	1541.94		1186.54 *	96943.5		182.342 *	1163.59		243.124
30-004-WR2-B	594.48 *	8955.66	136314	707.338		1566.67 *	97228.6		276.997 *	1386.87		195.234
30-004-WR2-C		5737.02	9544.79	845.87		1187.38 *	207550	1432.47 *	279.25 *	1873.99	1085.15 *	99.9326
30-004-WR2-D		9204.64	141630	1347.8	181.794 *	484.978 *	24674.7		79.2167 *	2669.32	247.057 *	215.573
30-004-WR2-E		11301.1	72729.3	1802.49		1402.2	49432.3	538.351 *	74.3496 *	1569.97		159.047
30-004-WR2-F		3155.78	156051	1005.6	212.017 *	1014.72 *	26754.4		1938.56	5545.89		128.752
30-004-WR-1-COMP		8739	99371.9	1359.96		669.146 *	85085.2		241.762 *	2267.28		197.799
30-004-WR-2-COMP		6899.98	69709	802.734		1005.66 *	140165	970.848 *	434.354	4007.42		94.2108
30-004-WR-3		1327.18 *	217261	707.052	323.221 *	321.147 *	18834.2			120.593 *		95.6336
30-004-WR-4		8582.02	41473.2	851.353		636.846 *	217252	811.096 *	1225.55	2972.15		113.569

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-004-SL-1	88.4773		11.0906 *	17377.2	35.231 *	397.788 *	70.3883 *	389.8		16.9823 *	
30-004-WR1-A	101.209			29086	46.3921 *	370.026 *	131.863 *	93.1932	280.356 *	13.3247 *	
30-004-WR1-B	126.203			6431.02	46.3276 *	175.026 *	58.2367 *	489.499	129.174 *	10.4702 *	
30-004-WR2-A	97.4128		16.0467 *	6330.93	70.7436 *	291.688 *		92.752	111.832 *		
30-004-WR2-B	56.712		14.5056 *	10619.5	58.2441 *	203.012 *	121.867 *	38.9333 *	135.251 *		36.3324 *
30-004-WR2-C	115.189		33.4947 *	20474.2		411.881 *	451.144	93.0552		21.5032 *	
30-004-WR2-D	56.2929			1879.15	23.6617 *			119.426	101.542 *	8.15751 *	
30-004-WR2-E	89.7164			301.218	53.9007			283.099			10.7836 *
30-004-WR2-F	27.8152			4642.82	25.0362 *			111.943	179.528 *		
30-004-WR-1-COMP	67.5126		7.13237 *	9631.79	37.8928 *	305.21 *	65.7541 *	115.546	127.852 *		
30-004-WR-2-COMP	77.5782			14659.1		256.677 *	68.6951 *	103.375	194.622 *	15.3356 *	
30-004-WR-3	23.5703			121.759		193.524 *		19.0333 *			
30-004-WR-4	119.23		39.6376	9228.49	58.8286 *	280.35 *	191.036 *	39.5821 *	193.102 *	10.2743 *	

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

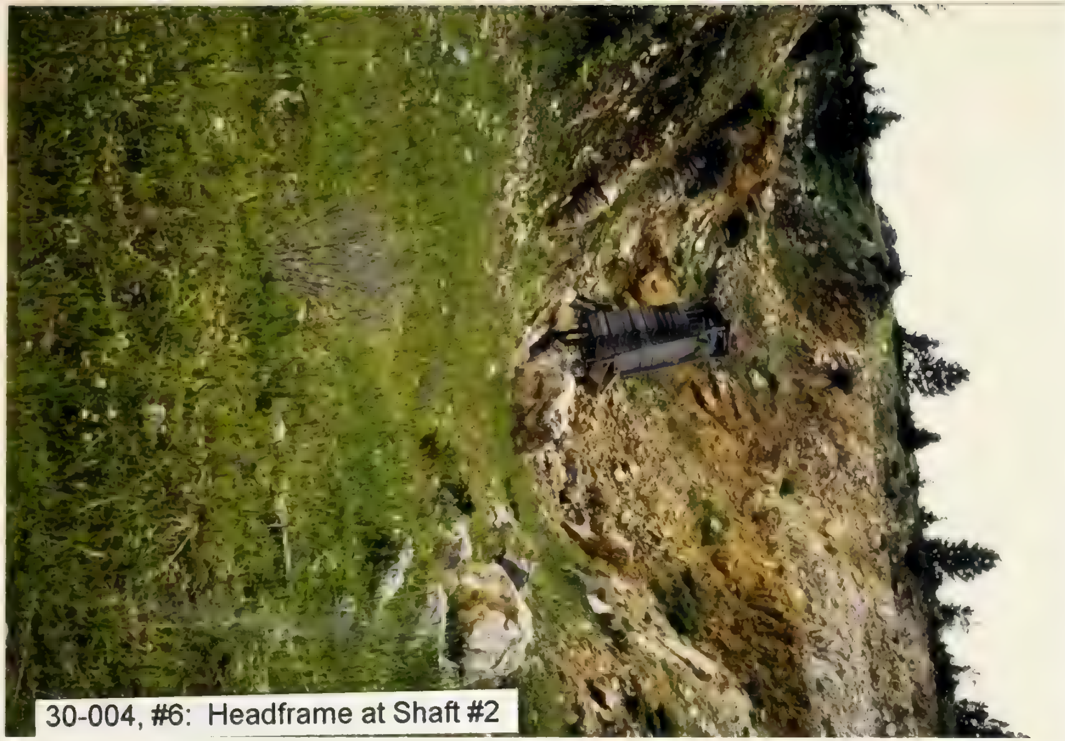
CUMBERLAND
PA NO. 30-004

AIMSS SCORESHEET

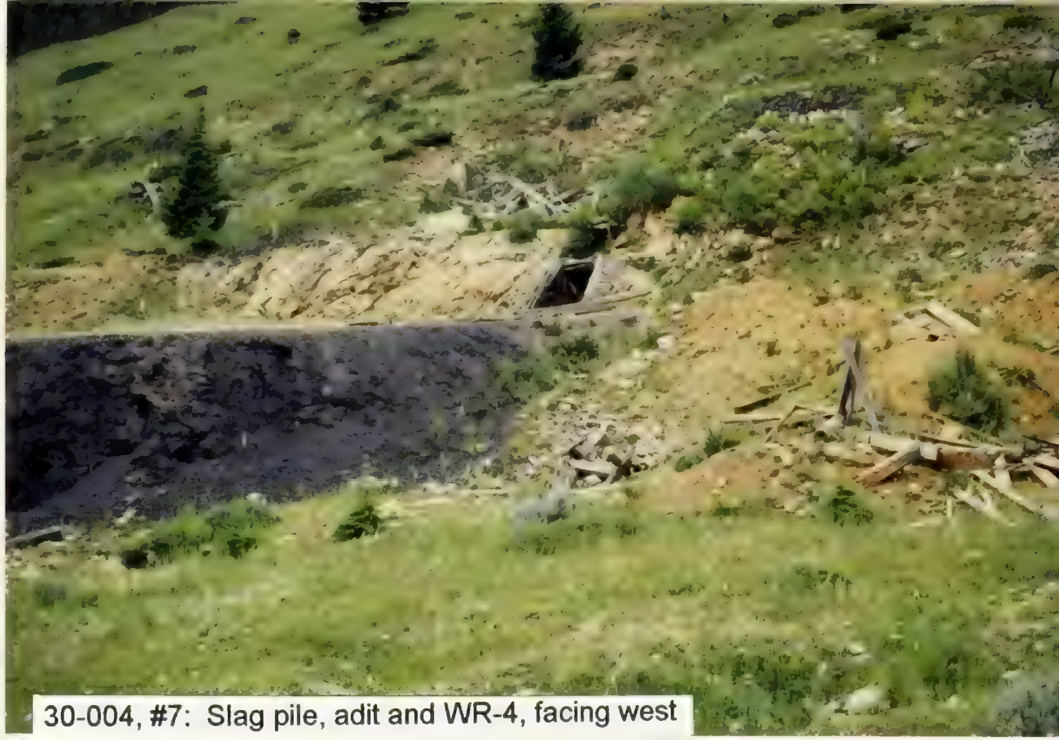
SITE NAME: CUMBERLAND
PA NUMBER: 30-004

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	686.514
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		3
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	3.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	823817
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	500
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	754.162
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	6787458
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	7.542
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	377
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.865
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	10298
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**76.22**

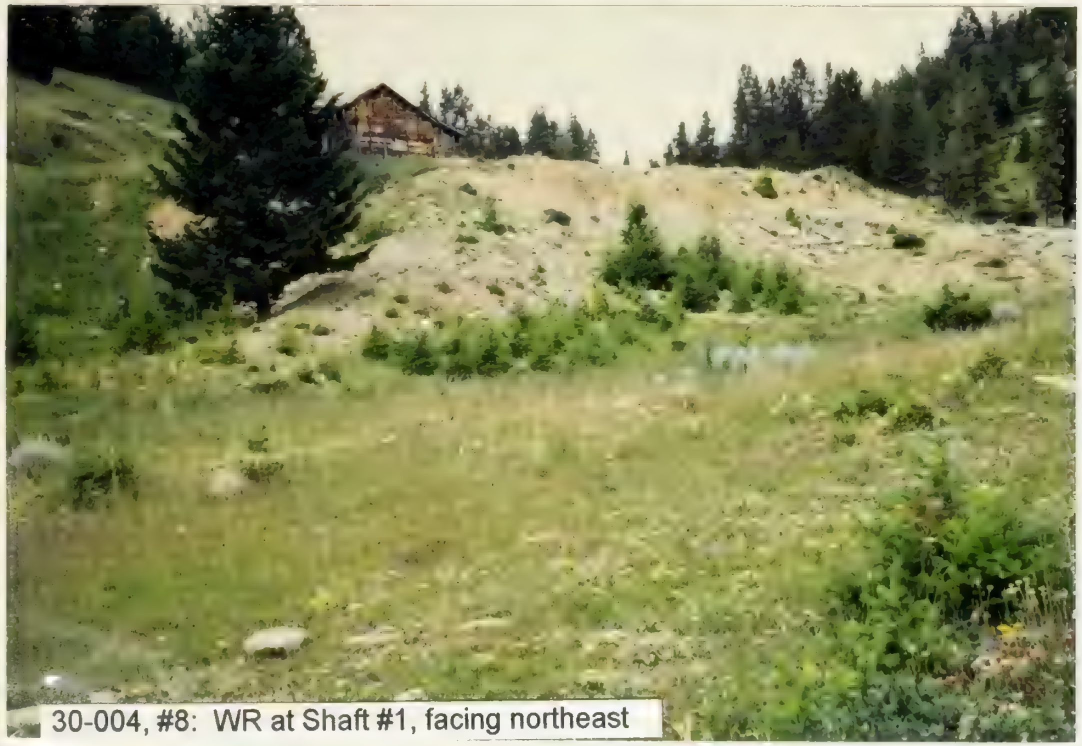
			SITE NAME:	CUMBERLAND
LINE NO.			PA NUMBER:	30-004
		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	315
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**63.00**



30-004, #6: Headframe at Shaft #2



30-004, #7: Slag pile, adit and WR-4, facing west



30-004, #8: WR at Shaft #1, facing northeast

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BELLE OF THE CASTLE **PA#:** 30-007

Date: July 29, 1993 **Time:** 0845

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: Unidentified person from Phelps Dodge

Weather/Seasonality Observations: Warm (65°-75°F); clear to overcast; breezy (10 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #2: Upper exploration cut, looking north; #3: HMO; #4: Adit #2; #5: WR-1 and Hensley Creek. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Fairly recent exploration (1 to 3 years old).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Reprocess for Cu, Fe or recontour, coversoil, and revegetate waste rock. Small, neutral pH, adit discharge that may or may not need treatment.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BELLE OF THE CASTLE PA#: 30-007

Legal Description: T 8N ;R 8E ;Sec. 2 , NE1/4 SW1/4 SW1/4

County: MEAGHER Mining District: CASTLE MOUNTAIN

Latitude: N 46° 28' 55" Longitude: W 110° 41' 32"

Primary Drainage Basin and Code: Alabaugh Creek/10040201
Secondary Drainage Basin: Hensley Creek

USGS Quadrangle map name(s): Castle Town

Mine Type/Commodities: Hardrock/Lead, Copper, Iron, Silver

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Erma Hensley Callahan, 1303 Royal Anne Drive, Coeur d'Alene, ID 83814; Dolly Vaughn Ward, 5481 Fitzpatrick Road, Hidden Hills, CA 91302; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Cumberland, Hamilton, and Yellowstone mines are within the same drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7000'-7200', Slope Approx. 27°, Aspect East (WR-1) and West (WR-2 and -3)

Land use: Mining X , Recreational___, Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? Approx. 1 acres.
Dimensions:___

Predominant vegetation types: Lodgepole pine, lupine, bluebells, grasses, juniper

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Berm is located at creek crossing, but easily driven over.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is adjacent to an unnamed tributary of Hensley Creek, which flows southeast away from the site. The site is underlain by Precambrian Belt argillite and dacite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: No historic information available; 0.11 oz. Ag/ton, 0.015 oz. Au/ton. Ore occurs in both the Belt argillite and diorite porphyry. Quartz vein material contains chalcopyrite.

Mine Operation?

Shafts - Yes X, No ___, # 1, Comment Open; HMO

Adits - Yes X, No ___, # 3, Comment 1 with unlocked door; 1 collapsed and flowing

Pits - Yes ___, No X, # ___, Comment ___

Placers - Yes ___, No X, # ___, Comment ___

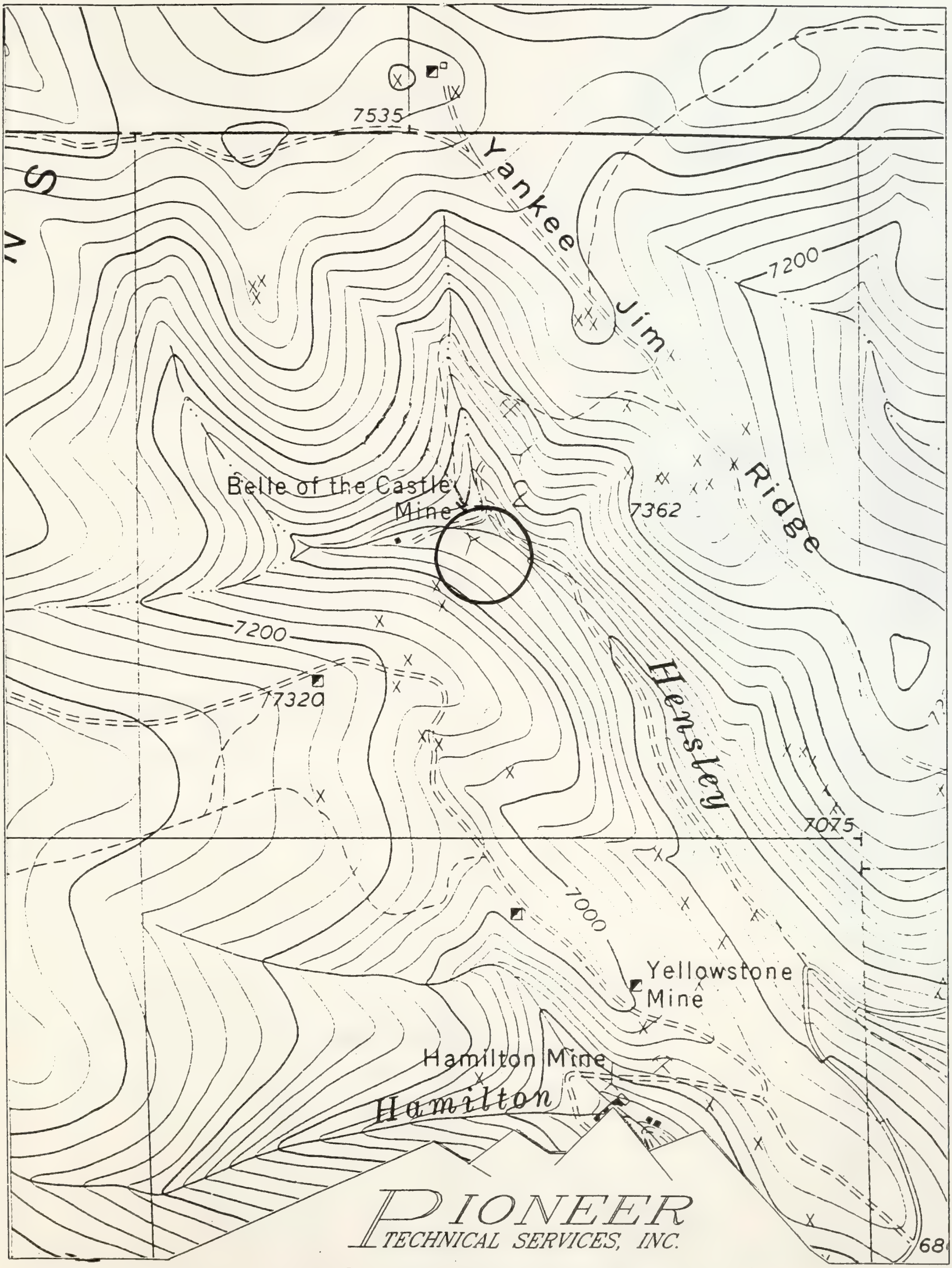
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

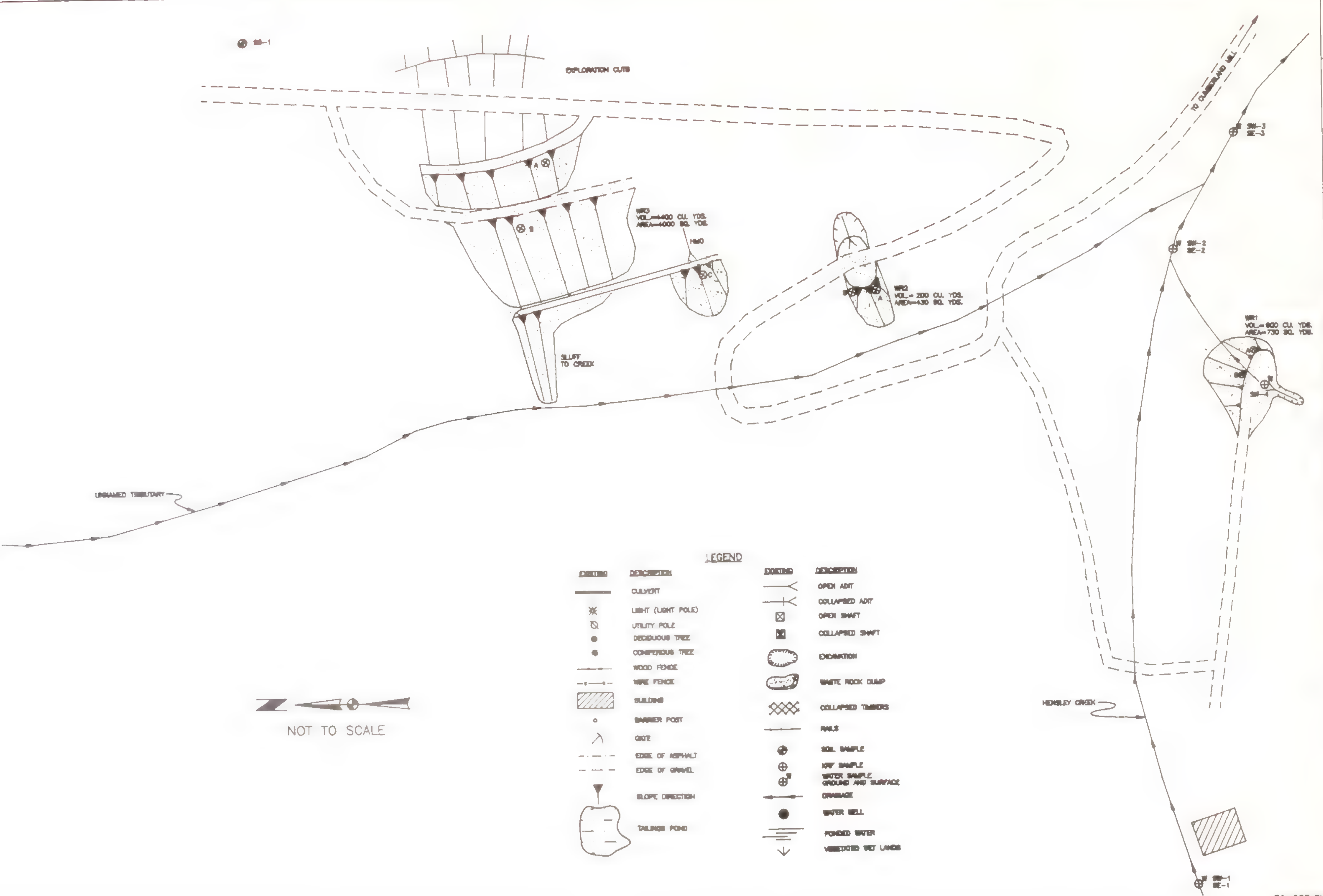
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? N/A



BELLE OF THE CASTLE, P.A. NO. 30-007

T08N, R08E, SECTION 02
SCALE: 1" = 1000'



DRAWN JTP DATE 10 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED MJB F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BELLE OF THE CASTLES PA# 30-007
CASTLE MOUNTAIN DISTRICT MEAGHER COUNTY

SHEET NO.

30-007.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	900	On creek side, east of Adit #1; south side of dump	None	6.2 (D)	0.05	30-007-WR-1	07/29/93 1700	T-Metals, ABA
WR-1B	WR		On creek side, north of Adit #1; north side of dump	None	6.8 (D)	0.06			
WR-2A	WR	200	South of Adit #2; southwest side of dump	None	5.9 (D)	0.04	30-007-WR-2	07/29/93 1710	T-Metals, ABA
WR-2B	WR		West of Adit #2; northwest side of dump	None	6.6 (D)	0.05			
WR-3A	WR	4,400	Middle of exploration cuts; southeast end	None	5.8 (D)	0.05			
WR-3B	WR		Assoc. with lowest exploration cut; northeast lower part of dump	None	5.6 (D)	0.04			
WR-3C	WR		At small dump with HMO, west of HMO; old dump material	None	6.05 (D)	0.05			
SS-1	BKGRND	N/A	Background soil approx. 100 feet northwest of upper exploration cuts; 50 feet above road	N/A	6.1 (D)	0.04	30-007-SS-1	07/29/93 1035	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-007-WR-1 is composite of WR-1A and -1B. 30-007-WR-2 is composite of WR-2A and -2B, and WR-3A through -3C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: At WR-1

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes___, No X , Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 23

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained sources with elevated metal values and discharging adit.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-4	AD	Adit discharge at WR-1	2 gpm (E)	6.97	160	NM	NM	20	N/A	30-007-SW-4	07/29/93 1115	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Unnamed tributary of Hensley Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-3 is in unnamed tributary.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 2 cfs
High Flow: 10 cfs , Average Flow: 2 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Adit discharge flowing through WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, irrigation, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Adit discharge is eroding WR-1.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Approx. 300′ upgradient of discharging adit in Hensley Creek	7.79	70	NM	NM	1.0	2 cfs (M)	30-007-SW-1	07/29/93 1150	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Approx. 300′ upgradient of discharging adit in Hensley Creek	N/A	N/A	N/A	N/A	N/A	N/A	30-007-SE-1	07/29/93 1150	T-Metals
SW-2	SW	Immediately downgradient of adit discharge (PPE) in Hensley Creek	7.60	50	NM	NM	1.0	2 cfs (M)	30-007-SW-2	07/29/93 1105	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Immediately downgradient of adit discharge (PPE) in Hensley Creek	N/A	N/A	N/A	N/A	N/A	N/A	30-007-SE-2	07/29/93 1105	T-Metals
SW-3	SW	Approx. 20′ downgradient below confluence with unnamed tributary in Hensley Creek	7.61	60	NM	NM	32	2 cfs (M)	30-007-SW-3	07/29/93 1000	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	Approx. 20′ downgradient below confluence with unnamed tributary in Hensley Creek	N/A	N/A	N/A	N/A	N/A	N/A	30-007-SE-3	07/29/93 1000	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres

Wetlands present: Yes_X_, No___, Describe: At confluence of unnamed tributary and Hensley Creek

Carbonate rocks/soils: Yes_X_, No___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Partial	6,570	5,913	Yes	Low
WR-2	SO4; FEOX	Moist	3,870	1,548	Yes	Low
WR-3	SO4; FEOX	Moist	36,000	35,280	Yes	Low
SW-4	Moss	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_None______

Evidence of recreational use on site: Yes_X_, No___, Describe:_Pop cans______

Accessibility - Fences, warning signs, closed roads?_Berm and bridge is out, but still accessible by driving over berm.______

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes_X_, No___, Comment_Adit______

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___ At WR-3C______

Hazardous structures: Yes___, No_X_, Number____, types and locations:______

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Belle of the Castle, Prepared by Chen-Northern, August 10, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Belle of the Castle, Prepared by Daphne Digrindakis, June 27, 1984.

USBM, Mines and Mineral Deposits (Except Fuels), Meagher County, Montana, Information Circular No. 7540, Written by Robert N. Roby, January 1950.

USGS, Topographic Map, Castle Town, Montana, 7 1/2 minute Quadrangle, 1972.

LABORATORY ANALYTICAL DATA

BELLE OF THE CASTLE
PA NO. 30-007

Belle of the Castles PA# 30-007
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/29/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30-007-SE-1	20 J	192 J	3.6 JX	20.4 J	12 J	55.9 J	24800	0.026 UJ	533 J	20 J	107 J	15 U	344 J	NR
30-007-SE-2	69 J	860 J	4.1 UX	74.5 J	25.5 J	5510 J	90200	0.08 J	1220 J	20 J	105 J	48 U	265 J	NR
30-007-SE-3	17 J	173 J	2 JX	22.7 J	10.6 J	248 J	40000	0.029 J	989 J	15 J	124 J	11 U	231 J	NR
30-007-WR-1	61 J	238 J	2.6 JX	38.5 J	9.4 J	1810 J	45800	0.024 J	2100 J	16 J	402 J	7 U	145 J	NR
30-007-WR-2	25 J	127 J	2.4 JX	28.8 J	20.7 J	2210 J	48400	0.101 J	375 J	18 J	35 J	5 U	46 J	NR
BACKGROUND	63	154 J	2.2	21.9 J	21.4	396 J	46600	0.062 J	878	21 J	52 J	6 U	135 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-007-WR-1	0.01	0.31	8.39	8.08	0.01	<0.01	0.01	0.00	8.39
30-007-WR-2	0.10	3.12	6.88	3.76	0.07	<0.01	0.03	0.00	6.88

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
30-007-SW-1	2.5	33.9	2.57 U	9.7 U	6.83 U	1.55 U	46.2 J	0.12	5.6	12.7 U	0.72 U	30.7 U	18.9	11
30-007-SW-2	2.7	40.9	2.57 U	9.7 U	6.83 U	42.2	171 J	0.072	10.5	12.7 U	0.72 U	30.7 U	20.6	11.8
30-007-SW-3	3.63	33.4	2.57 U	9.7 U	6.83 U	3.6	55.4 J	0.063	5.6	12.7 U	0.72 U	30.7 U	18.8	14.2
30-007-SW-4	11.9	22.2	2.57 U	13	6.83 U	3320	18900 J	0.11	384	14.4	9.28 J	30.7 U	51.9	65.4

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-007-SW-1	49	< 5.0	6	< 0.05	NR
30-007-SW-2	48	< 5.0	7	< 0.05	NR
30-007-SW-3	51	< 5.0	6	< 0.05	NR
30-007-SW-4	150	< 5.0	50	< 0.05	NR

LEGEND

SE1 – Upgradient of discharging adit in Hensley Creek.
SE2 – Immediatly downgradient of adit discharge in Hensley Creek.
SE3 – Downgradient below confluence with unnamed tributary of Hensley Creek.
WR1 – Composite of subsamples WR1A and 1B.
WR2 – Composite of subsamples WR2A, 2B, 3A, 3B, and 3C.
BACKGROUND – Approx. 100' NW of upper, 50' above road. From Belle of the Castles (30-007-SS-1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW3 – Same as sample SE3.
SW4 – Adit discharge of waste rock dump 1.

XRF ANALYSIS RESULTS

BELLE OF THE CASTLE
PA NO. 30-007

Belle of the Castle PA# 30-007
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-007-SS-1		8634.98	35542.3	1665.26		1262.32	45578.2	405.413 *	449.097	199.286	76.8795 *	92.1597
30-007-WR1-A		11696	26461.3	1334.13	172.748 *	5297.5	66897	718.479 *	1854.48	378.495		169.69
30-007-WR1-B		7349.1	38610.5	966.947	193.583 *	3640.62	89341.2	781.2 *	1442.85	414.487		104.31
30-007-WR2-A		10151.8	20072.2	1727.25	144.009 *	808.317 *	106025	584.836 *	1076.06	94.2295 *		218.221
30-007-WR2-B		14545.4	11995.8	2757.59			68169.6	569.936 *	486.273	69.8042 *		428.423
30-007-WR3-A		8054.58	34987.3	1474.04		1598.07	128901	1282.22 *	8145.04	311.428	147.347 *	187.332
30-007-WR3-B		9190.31	24516.1	2389.37		838.647 *	164478	1686.26 *	2397.06	229.258 *	70.7655 *	211.382
30-007-WR3-C		12711.1	11906.9	3083.89		391.174 *	114533	1137.88 *	1224.9	100.675 *		331.107
30-007-WR-1-COMP		9817 $	19219 $	2111 $	183 $	358 $	94238 $	618 $	2414 $	166 $	45 $	237 $
30-007-WR-2-COMP		7292 $	27296 $	922 $	90 $	5137 $	81707 $	438 $	1785 $	363 $	69 $	124 $

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-007-SS-1	162.145			29.3818 *	50.2771			215.845		11.1834 *	
30-007-WR1-A	159.601		22.0924	354.99	77.4544	266.987 *		969.271		20.6172 *	
30-007-WR1-B	133.498		24.0779	406.559	44.7105 *	200.793 *		320.623	110.255 *	16.8235 *	
30-007-WR2-A	194.375		19.2618 *	36.2086 *	64.7485	158.846 *		703.483	132.353 *	13.7782 *	6.94085 *
30-007-WR2-B	219.527		7.67024 *	24.7831 *	52.6949 *	185.944 *		1237.22		18.2716 *	9.08756 *
30-007-WR3-A	179.177		7.82446 *		17.9203 *	440.008 *		359.012	230.853 *	19.6646 *	
30-007-WR3-B	204.915		21.2973 *		21.977 *	357.421 *		490.296	194.009 *	12.6216 *	
30-007-WR3-C	219.384		28.3515	121.675	45.4161 *	261.782 *		988.562	102.11 *	13.5752 *	8.44909 *
30-007-WR-1-COMP	180 $		11 $	33 $	36 $	153 $		595 $	161 $	16 $	
30-007-WR-2-COMP	130 $		36 $	385 $	70 $	166 $		683 $	158 $	13 $	7 $

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BELLE OF THE CASTLE
PA NO. 30-007

AIMSS SCORESHEET

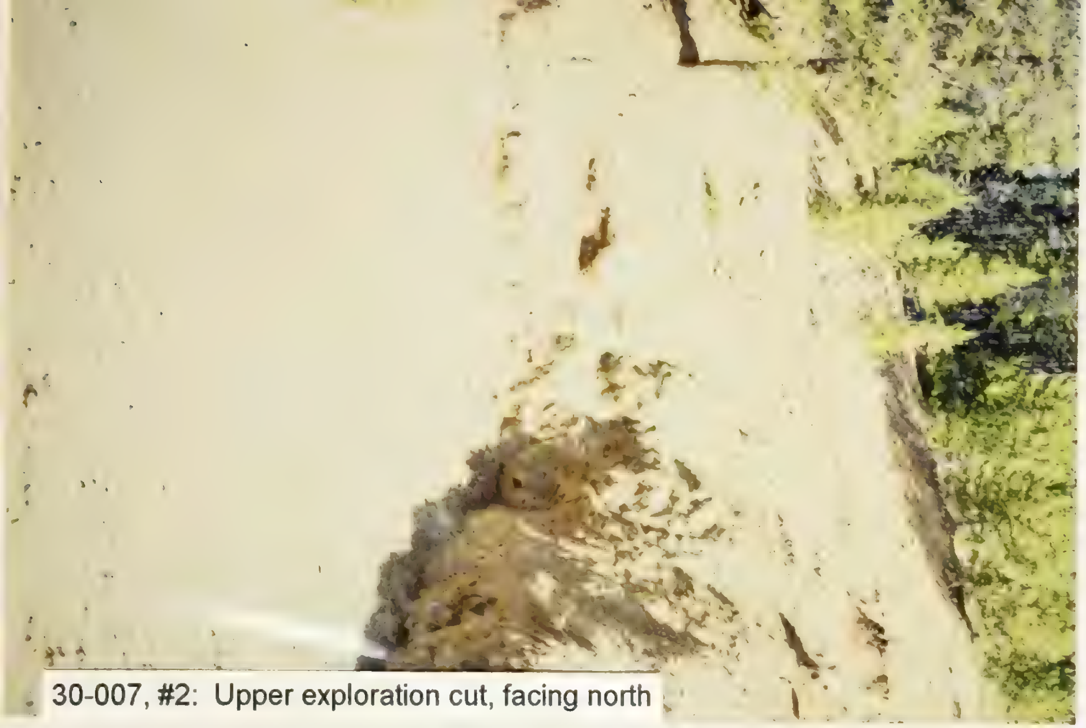
SITE NAME: BELLE OF THE CASTLES
PA NUMBER: 30-007

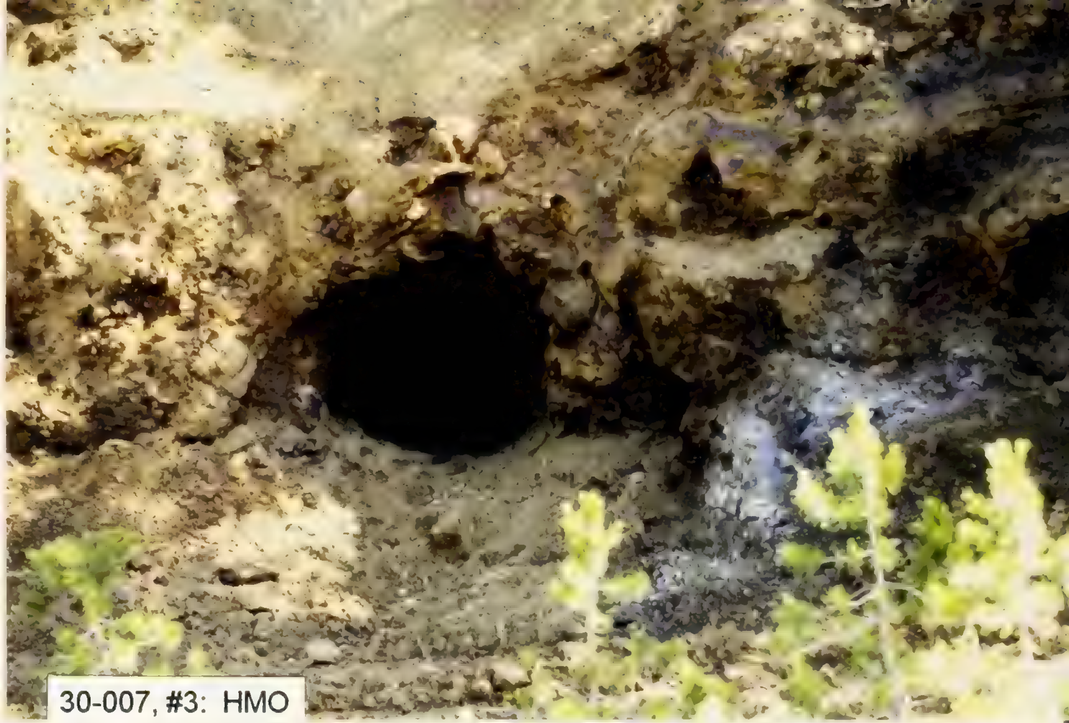
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.206
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		23
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	23.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1895
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.281
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	3794
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.006
29	AIR - TARGETS	POPULATION - 4 MILES		0
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	0
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.06**

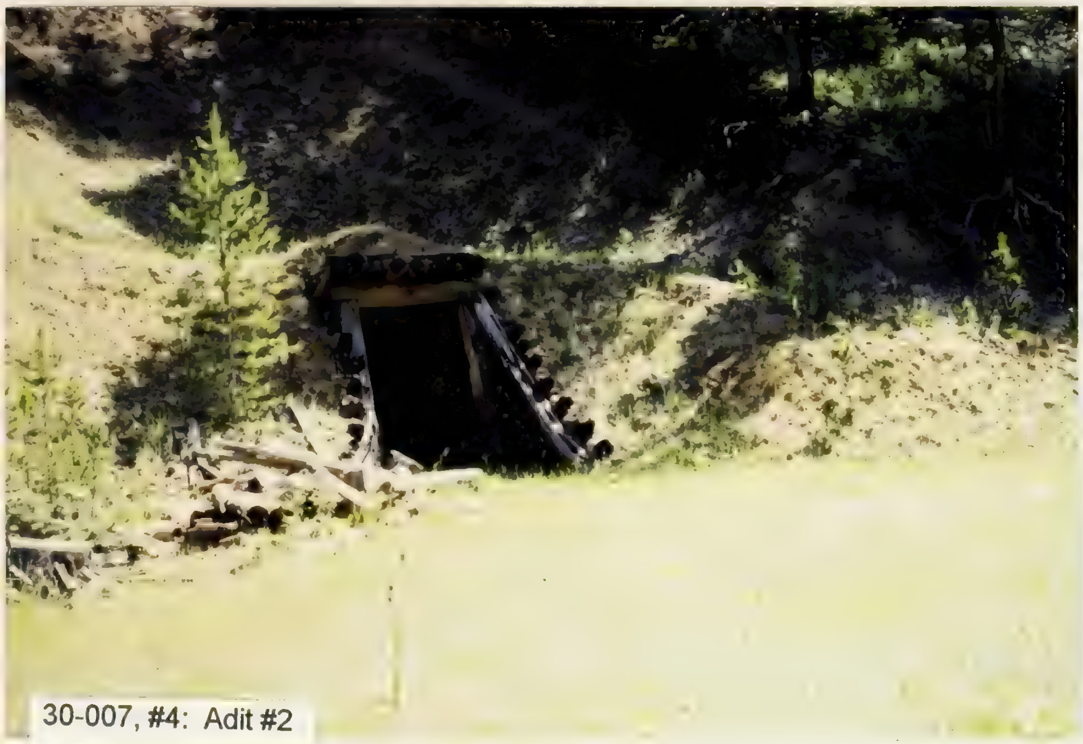
SITE NAME: BELLE OF THE CASTLES
PA NUMBER: 30-007

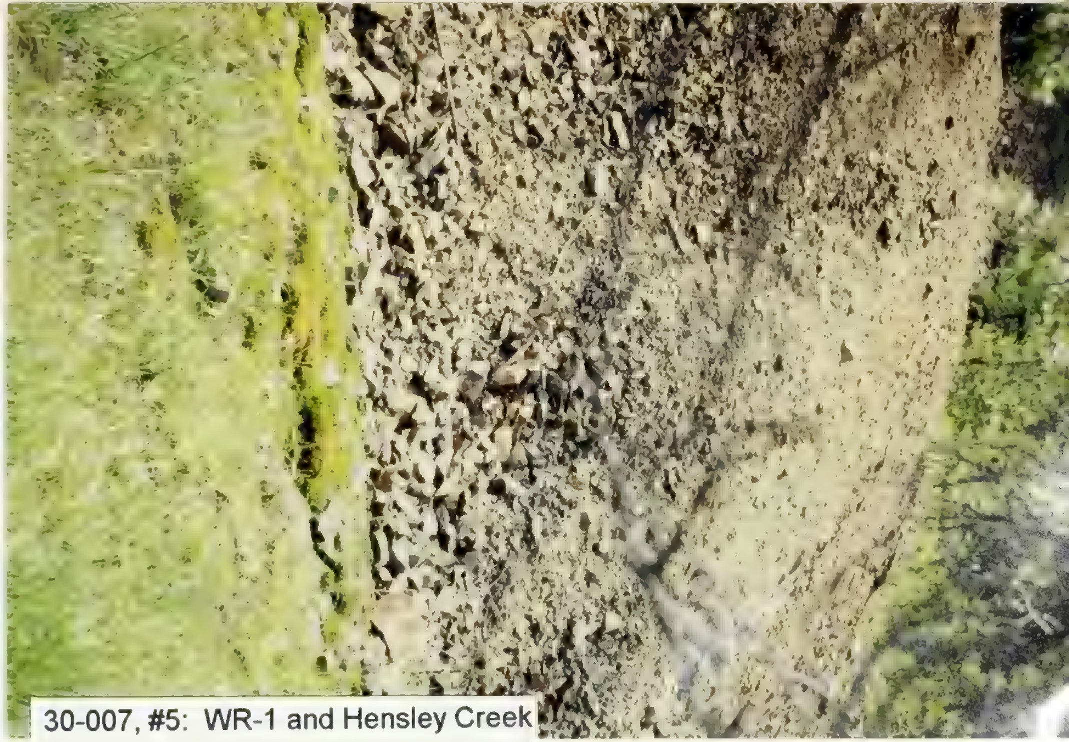
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**1.00**


30-007, #2: Upper exploration cut, facing north


30-007, #3: HMO


30-007, #4: Adit #2


30-007, #5: WR-1 and Hensley Creek

SMITH RIVER

CEDAR CREEK

MINERAL

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: SW NE S10 PA#: 30-078

Date: July 28, 1993 Time: 1600-2030

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Calm; clear; warm (65°F); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #5: Shaft 1; #6: WR-2; #7: House. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Additional study needed for water treatment requirements and alternatives; grade, amend, and revegetate dump material. Fill or plug flooded shaft.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SW NE S10 PA#: 30-078

Legal Description: T 11N ;R 7E ;Sec. 10 ,SW 1/4 NE1/4 ___1/4

County: MEAGHER Mining District: SMITH RIVER

Latitude: N 46° 48' 01" Longitude: W 110° 49' 42"

Primary Drainage Basin and Code: Newland Creek/10030103
Secondary Drainage Basin: Newland Creek

USGS Quadrangle map name(s): Charcoal Gulch

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Golden Eagle Mining Co., Box 1127, 504 Bank Street, Wallace, ID 83873; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5800', Slope 0-10°,
Aspect Western

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3.25 acres.
Dimensions: Approx. 205 feet x 670 feet

Predominant vegetation types: Lodgepole pine, Douglas fir, juniper, sage brush, grasses

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites). Must get permission to cross private land at residence.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 10 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The mine is situated at the head of an unnamed intermittent tributary to Newland Creek. Water leaving the site would flow southwest approx. 1/4 of a mile to confluence with Newland Creek which then flows west.

Mining/milling history, ore type/tenor, host rock, gangue: The shaft was reportedly driven to 100' deep by Fred Kennick in the 1940's.

Mine Operation?

Shafts - Yes X, No ___, # 1, Comment Flooded

Adits - Yes ___, No X, # ___, Comment

Pits - Yes ___, No X, # ___, Comment

Placers - Yes ___, No X, # ___, Comment

Other - Yes X, No ___, # 1, Comment Exploration trench

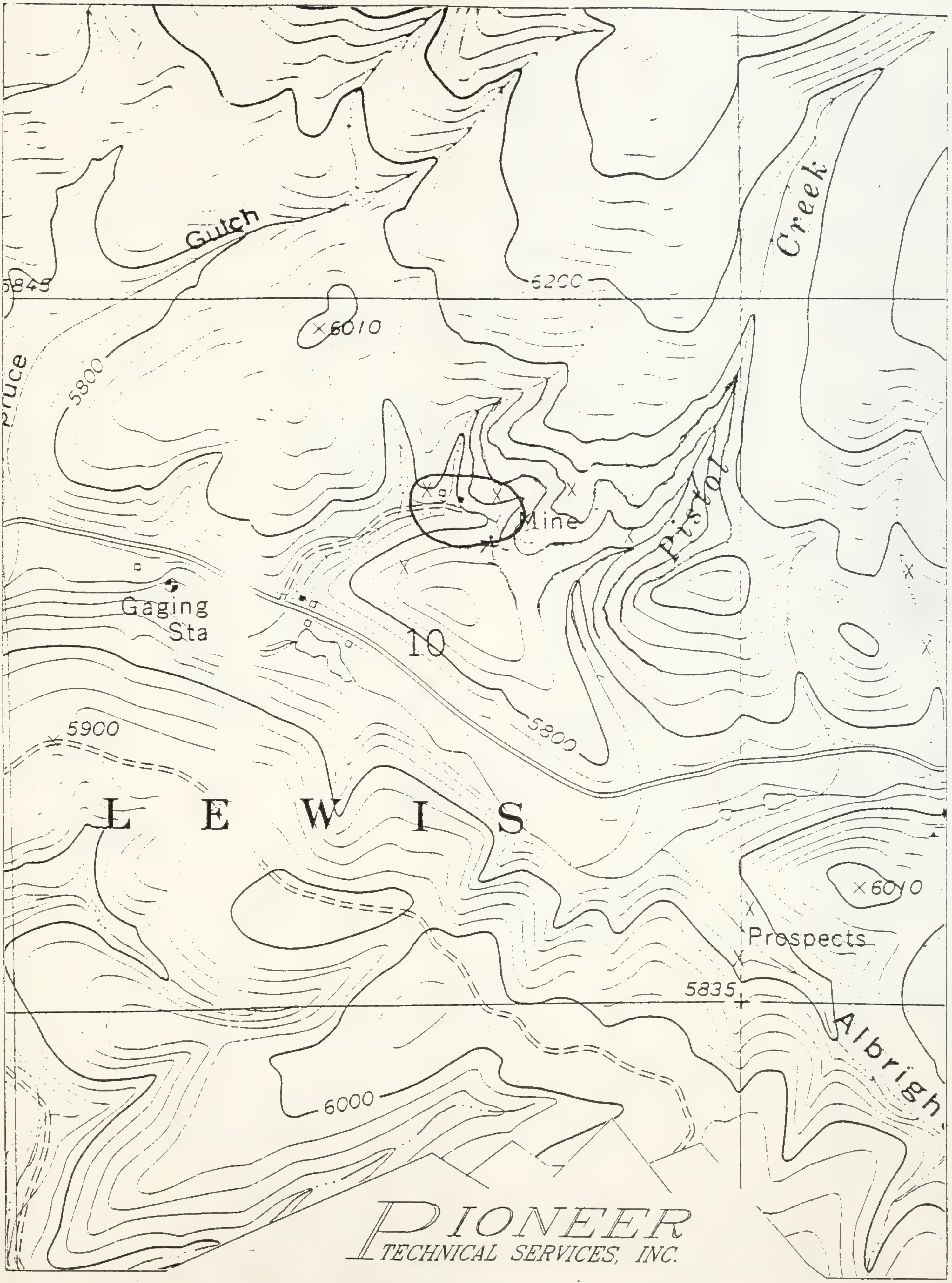
Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

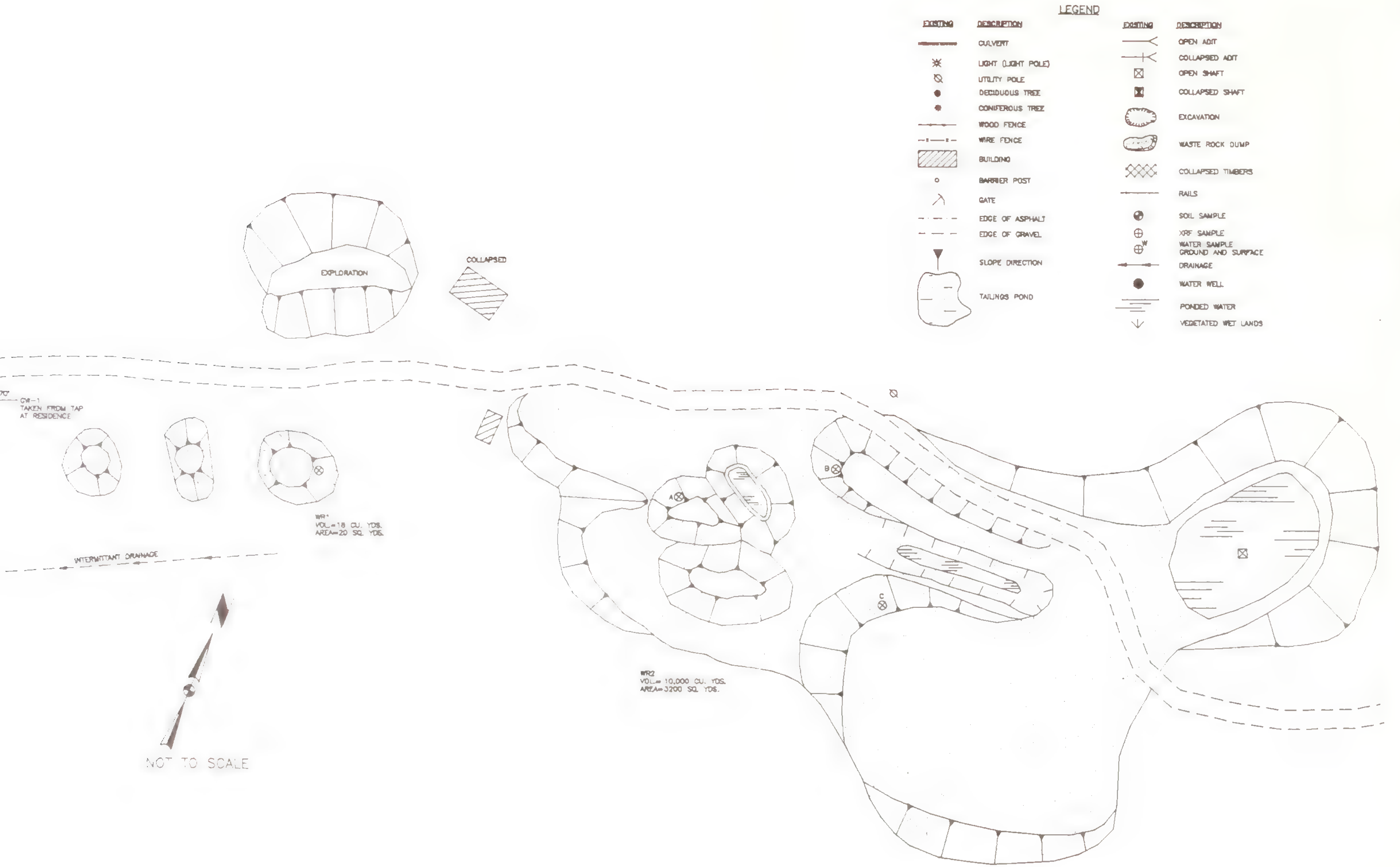
ell No.	Location	Depth	Yield	Static Water Level
M:23799	11N 07E 04 C	54.0	45.0	15.00
M:23800	11N 07E 04 CBD	60.0	12.0	4.00
M:23801	11N 07E 04 CCA	50.0	45.0	10.00
M:123659	11N 07E 04 CDCA	193.0	18.0	5.00
M:23802	11N 07E 04 CDCC	119.0	3.0	40.00
M:23803	11N 07E 04 CDCC	119.0	3.0	40.00
M:123319	11N 07E 04 CDD	96.0	15.0	14.00
M:23804	11N 07E 09 BAA	58.0	20.0	6.00
M:23805	11N 07E 09 BADA	60.0	20.0	7.00
M:23806	11N 07E 09 BADD	66.0	0.0	13.00



PIONEER
TECHNICAL SERVICES, INC.

SW SE S10, P.A. NO. 30-078

T11N, R07E, SECTION 10
SCALE: 1" = 1000'



DRAWN JTP DATE 8 DEC 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TDH

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
SW NE SECTION 10 PA# 30-078
SMITH RIVER DISTRICT MEAGHER COUNTY

SHEET NO.

30-078.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	18	Three small piles west of WR-2, possibly concentrate samples on east side	None	5.0 (D)	0.03	30-078-WR-1	07/28/93	T-Metals, ABA
WR-2A	WR	10,000	Waste rock west of highway, sample on west end on top	None	4.6 (D)	0.05	30-078-WR-2	07/28/93	T-Metals, ABA
WR-2B	WR		Middle of WR-2, south of power pole	None	< 3.5 (D)	0.04			
WR-2C	WR		South of WR-2B, near south end of dump	None	5.5 (D)	0.05			
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	30-078-SS-1	07/28/93	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 30-078-WR-1 is a composite of WR-1; 30-078-WR-2 is a composite of WR-2A, 2B, and 2C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes_X_, No___, Number:_1_ Identification:_Shaft #1_

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_39_

Distance to nearest well used for drinking?_670 feet downgradient_

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Possible isolated contamination due to precipitation percolating through acidic waste rock.

Other observations/notes: Groundwater is well buffered with high pH and alkalinity.

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Pierson, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	RW	Residential well in drainage below mine	10 gpm (E)	7.95	690	314	7.3	300	28' SWL	30-078-GW-1	07/28/93 1900	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3
GW-2	RW	QA/QC duplicate of GW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30-078-GW-2	07/28/93 1900	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3
GW-3	SH	Flooded shaft pond	0	8.5	550	202	20.7	184	100'	N/A	N/A	Field Parameters

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Did not sample shaft for laboratory analysis due to presence of well downgradient. Purged 150 gallons from GW-1 prior to sampling

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Small intermittent tributary to Newland Creek; this drainage does not have frequent or abundant flow.

Other surface water: Yes X , No___, Name(s)/Description: Precipitation ponds or puddles in WR-2 (SW-1 and SW-2)

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-1 and WR-2 are in the intermittent drainage.

Approximate Flood frequency?___1 yr, X 10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? From the appearance of the vegetation in the drainage and the small drainage area above the mine, it is estimated that a 10 year storm event would be required to have run off in this drainage at less than 0.5 cfs.
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet to precipitation ponds

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery, irrigation, stock watering, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Small precipitation pond, (pond #2) in WR-2	3.04	2840	435	22.4	0	0	N/A	N/A	Field Parameters
SW-2	SW	Small precipitation pond, (pond #3) below WR-2	7.43	250	300	22.1	N/A	0	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No lab samples taken because ponds were very small and no water was flowing.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 8 acres of gently sloping land present between mine and the residence of the bottom of the drainage.

Wetlands present: Yes___, No___, Describe: In Newland Creek approx. 1/4 mile below mine.

Carbonate rocks/soils: Yes X, No___, Describe: Subsurface limestone deposit suspected due to high pH and alkalinity of the ground water.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 800 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; Low pH	Dry	180	180	Yes	None
WR-2	SO3; Low pH	Partial	28,800	23,000	Yes	Low
GW-3	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

MDSL AMRB/PIONEER 4/9/93

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Private controlled access to the site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___
Shaft is flooded but may be as deep as 100 feet.

Hazardous structures: Yes_X_, No___, Number_2_, types and locations:_
Cabins

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations: Highwall averages approximately 40 feet high.

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for SW NE S10, Prepared by Chen-Northern, August, 24, 1989.

USGS, Topographic Map, Charcoal Gulch, Montana, 7 1/2 minute Quadrangle, 1971.

LABORATORY ANALYTICAL DATA

SW NE S10
PA NO. 30-078

SW NE Section 10 PA# 30–078
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/28/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
30–078–WR–1	23 J	40.1 J	4.8 JX	2.1 U	1.5 U	104 J	3640	4.35 J	0.9 U	3 U	3640 J	116	324 J	NR
30–078–WR–2	57 J	177 J	6.6 JX	6.4 J	11.1 J	70.5 J	29600	4.35 J	195 J	23 J	757 J	12	512 J	NR
BACKGROUND	18 J	121 J	1.4 JX	8.1 J	9.2 J	19.3 J	24100	0.038 J	579 J	19 J	68 J	7 U	125 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30–078–WR–1	0.86	26.9	–3.34	–30.2	0.43	0.03	0.40	0.94	–4.27
30–078–WR–2	0.45	14.1	–0.95	–15.0	0.42	<0.01	0.03	0.00	–0.95

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
30–078–GW–1	1.69 U	81.8	2.57 U	9.7 U	6.83 U	5.77 J	45.9 J	0.096	4.08 U	12.7 U	1.55 U	30.7 U	15.9 JX	334
30–078–GW–2	3.21	90.7	2.57 U	9.7 U	6.83 U	3.73	34.7 J	0.13	4.08 U	12.7 U	1.01 J	30.7 U	7.9	370

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
30–078–GW–1	387	< 5.0	87	0.15	NR
30–078–GW–2	374	< 5.0	90	0.16	NR

LEGEND

WR1 – Sample of the subsample WR1.
WR2 – Composite of subsamples WR2A, 2B, and 2C.
BACKGROUND – From the SW NE Sec. 10 (30–078–SS–1).
GW1 – Residential well in drainage below mine.
GW2 – QA/QC duplicate of 30–078–GW–1.

CEDAR CREEK

MINERAL

XRF ANALYSIS RESULTS

SW NE S10
PA NO. 30-078

Mine Name: SW NE Section 10 PA# 30-078
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
30-078-WR2-A		31081.3	4925.19	2291.07		496.729 *	30948.4	345.85 *	95.4983 *	540.944		618.442
30-078-WR2-B		49521.6	2893.88	4617.26		446.462 *	47237.2		187.694 *	867.613		1296.3
30-078-WR2-C		32706.9	1820.73	2077.63			23742.1		70.2043 *	210.755	55.6778 *	654.371
30-078-WR-1		35537.8	1401.79	1909.15			6440.26		45.2121 *	232.372		632.794
30-078-WR-2-COMP		39471.3	4137.48	2893.61		505.114 *	45050		153.815 *	642.344		863.736

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
30-078-WR2-A	154.686			616.166	169.195			589.849	112.596 *	12.3937 *	15.832 *
30-078-WR2-B	367.319			414.578	194.05	246.924 *	105.162 *	1426.34	132.706 *	22.0614 *	22.0979 *
30-078-WR2-C	131.432			561.131	199.857			467.042		17.2405 *	18.8238 *
30-078-WR-1	103.098			1707.78	187.379	202.255 *	83.1334 *	450.731	109.56 *	14.07 *	20.4788 *
30-078-WR-2-COMP	224.866			630.526	201.64	182.781 *		1141.98		18.1202 *	20.5297 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SW NE S10
PA NO. 30-078

AIMSS SCORESHEET

SITE NAME: SW NE S10
PA NUMBER: 30-078

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	7.526
6	GW - TARGETS	WELLS - 1 MI. x 2.5		25.0
7		WELLS - 1 TO 4 MI		29
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	64.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	192666
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	8.331
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	59983
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.087
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	348
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.079
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	11
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	174
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**2.53**

			SITE NAME:	SW NE S10
			PA NUMBER:	30-078
LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	255
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	11
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**28.05**

30-078, #5: Flooded shaft

30-078, #6: WR-2

CEDAR CREEK

MINERAL

CEDAR CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: CAJUN QUEEN NO. 1 **PA#:** 31-049

Date: August 3, 1993 **Time:** 0900-1300

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Clark, Lasher,
Belanger; Pioneer

Visitors: None

Weather/Seasonality Observations: Clear skies; sunny; warm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #13: Ball Mill, Shaker Table Tailings Pond (TP-1); #14: Recent open cut; #15: Old waste rock below recent open cut; #16: Lower caved adit area.
Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate dump and tailings material.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CAJUN QUEEN NO. 1 PA#: 31-049

Legal Description: T 15N ;R 27W ;Sec. 7 , NE1/4SE 1/4 ___1/4

County: MINERAL Mining District: CEDAR CREEK

Latitude: N 47° 04' 25" Longitude: W 115° 03' 15"

Primary Drainage Basin and Code: Cedar Creek/17010204
Secondary Drainage Basin: Mary Ann Gulch

USGS Quadrangle map name(s): Illinois Peak

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Calvin Galloway, 2319 Hwy 2 East, Kalispell, MT 59901. (406) 752-0695; Lolo National Forest.

Relationship to other mines/sites in the area/district: Other workings owned by this operator approx. 3/4 mile away.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5400', Slope 10°-15°,
Aspect Southeast

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 1 acres.
Dimensions:

Predominant vegetation types: Douglas fir, spruce, larch, Mountain maple, huckleberry, thimbleberry, pine grass

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Locked gate 1/2 mile from mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is located near the head of an unnamed tributary to Mary Ann Gulch Creek, which flows south past the east side of the site. Unnamed tributary meets Mary Ann Gulch approx. 200 yds. below the site. Mary Ann Gulch (perennial) then flows 1/2 mile southeast to confluence with Cedar Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Recent mining with a small crusher and floatation mill; currently inactive. No other information available.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment___

Adits - Yes X, No___, # 1, Comment Below mine area; HMO

Pits - Yes___, No X, # ___, Comment___

Placers - Yes___, No X, # ___, Comment___

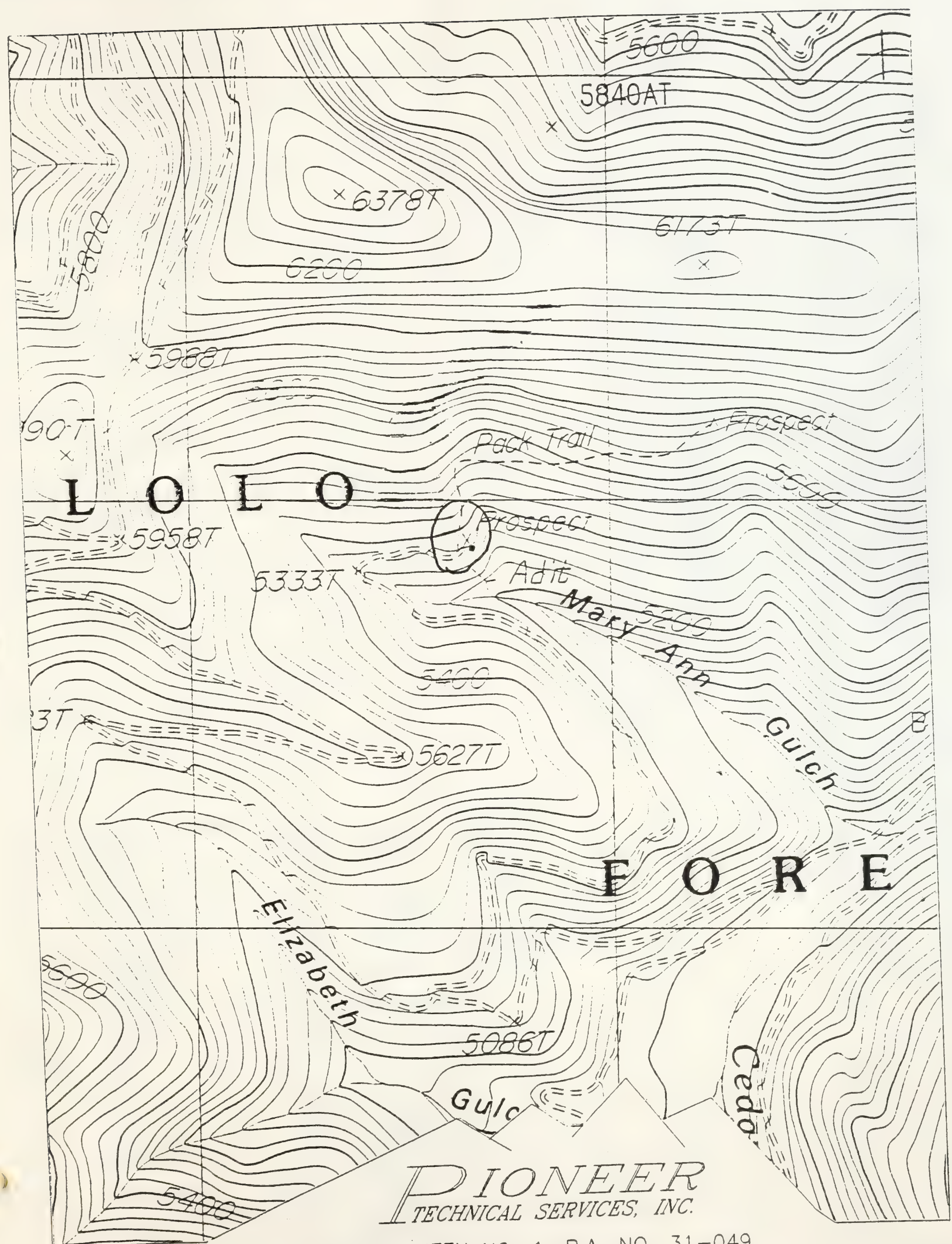
Other - Yes X, No___, # 3, Comment Dozer cuts

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: There is a small test mill at the present time.

Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed: Unknown

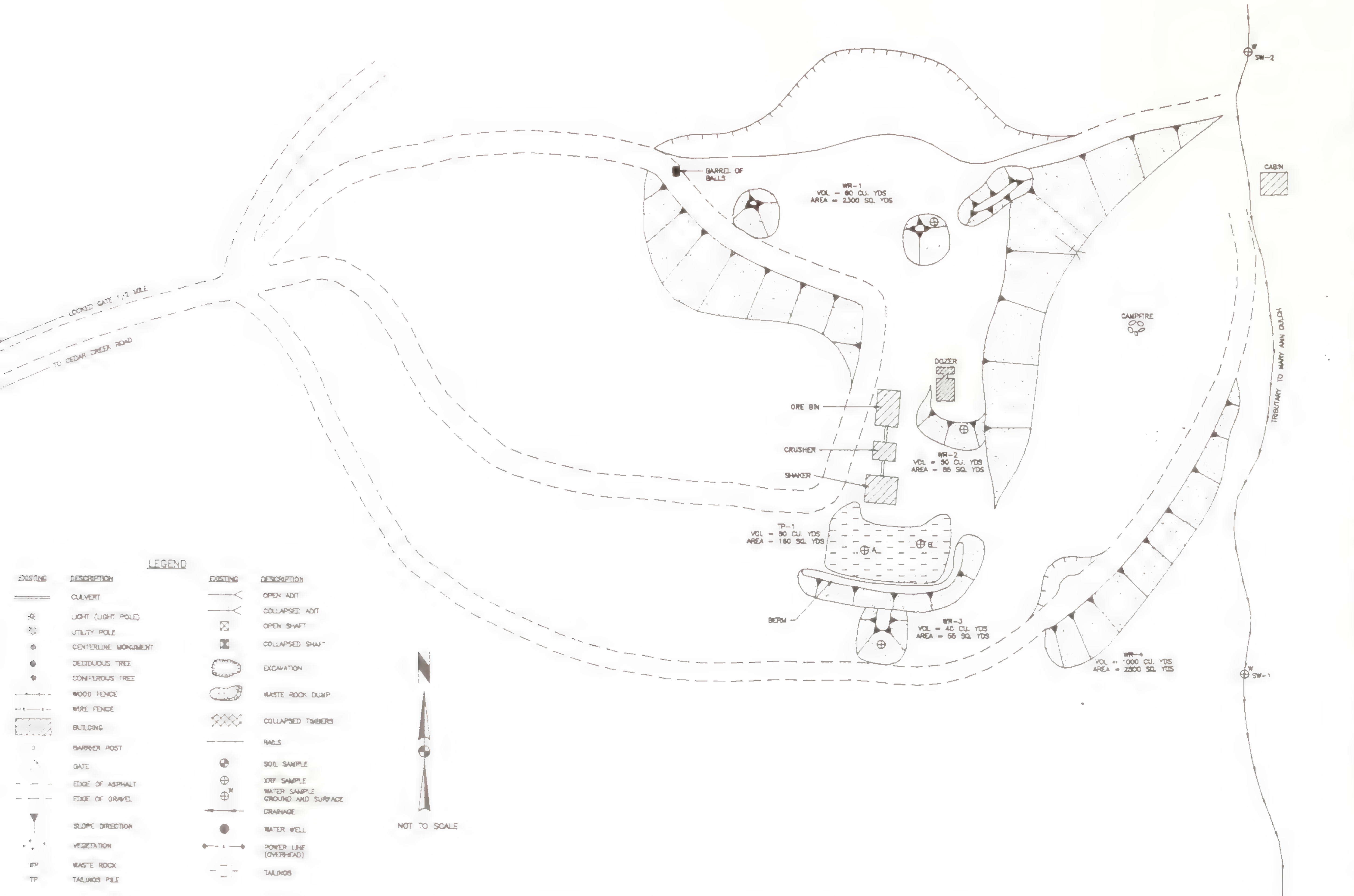
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Floatation/gravity



CAJUN QUEEN NO. 1, P.A. NO. 31-049

T15N, R27W, SECTION 07

SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

CAJUN QUEEN NO. 1 PA# 31-049
CEDAR CREEK DISTRICT MINERAL COUNTY

SHEET NO.

31-049.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 100% medium sand

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Average depth is 16 inches; no stratification.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist throughout

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): The impoundment is very small and in good condition.

Comments on potential for mitigation: Cover with topsoil and revegetate when mining is complete.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Belanger, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	60	North side of upper most dump	None	6.5 (D)	0.045	31-049-WR-1	08/04/93 1820	T-Metals, ABA
WR-2	WR	50	Below WR-1 and above milling area; southeast side	None	6.5 (D)	0.05			
WR-3	WR	40	Waste rock below tailings impoundment; south side	None	6.5 (D)	0.05			
WR-4	WR	1,000	Waste rock east of tailings; south side	None	6.9 (D)	0.03			
TP-1A	TAIL	80	West side of impoundment; 18", gray medium sand	Impoundment	6.9 (D)	0.03	31-049-TP-1	08/04/93 1820	T-Metals, ABA
TP-1B	TAIL		East side of impoundment; 12", tan/gray medium sand	Impoundment	7.0 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-049-WR-1 is composite of WR-1 through WR-4. 31-049-TP-1 is composite of TP-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes___, No_X_;
Number of well logs:_0_____

Distance to nearest well used for drinking?_ > 4 miles__________

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Shallow workings; no dump material or tailings in contact with the alluvial aquifer.

Other observations/notes:_N/A__________

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No___, Name(s): Unnamed tributary to Mary Ann Gulch and Mary Ann Gulch

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 10 feet; Unnamed tributary skirts around the edge of a very old revegetated waste rock dump (WR-4).

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetlands, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Unnamed tributary at bottom of WR-4	8.66	230	359	8.5	N/A	15 gpm (M)	N/A	N/A	Field Parameters
SW-2	SW	Unnamed tributary above cabin	8.41	230	324	7.2	N/A	15 gpm (M)	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No lab samples taken due to no measured impact and no source present.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Moderately steep drainage with little area for treatment.

Wetlands present: Yes___, No_X_, Describe:___

Carbonate rocks/soils: Yes___, No_X_, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Approx. 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Belanger, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None	Dry	20,700	19,700	Yes	Low
WR-2	None	Dry	765	725	Yes	Low
WR-3	None	Dry	495	470	Yes	Low
WR-4	None	Partial	22,500	11,250	No	None
TP-1	None	Partial	1,440	1,425	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe: Not at time of investigation, but mine does operate intermittently.

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No X , Describe:_______

Accessibility - Fences, warning signs, closed roads? Locked gate 1/4 mile from site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes X , No___, Comment Possible Bald Eagle
Bat Habitat - Yes X , No___, Comment Possible in adit

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - 2
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Adit

Hazardous structures: Yes X , No___, Number 1 , types and locations: Standing cabin

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 2 , types and locations: WR-1 and WR-3 have highwalls.

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No X , Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Cajun Queen No. 1, Prepared by Northern Engineering and Testing, July 17, 1988.

USGS, Topographic Map, Illinois Peak, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

CAJUN QUEEN NO. 1
PA NO. 31-049

Cajun Queen No. 1 PA# 31-049
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/03/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-049-TP-1	4.58 U	51.8	0.7	2.1	3.75	17.1 J	4980	0.01 UJ	212	3.74	110 J	5.96 U	57.6	NR
31-049-WR-1	5.1 U	54	1.7	3.2	1.86	16.9 J	8050	0.072 J	435	3.89	88 J	6.64 U	102	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.01 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-049-TP-1	0.01	0.31	6.64	6.33	0.01	<0.01	0.01	0.00	6.64
31-049-WR-1	0.01	0.31	16.3	16.0	<0.01	<0.01	0.01	0.00	16.3

LEGEND
TP1 - Composite of subsamples TP1A and 1B.
WR1 - Composite of subsamples WR1, 2, 3, and 4.
BACKGROUND - From the Nancy Lee Mine
(31-001-SS-1).

XRF ANALYSIS RESULTS

CAJUN QUEEN NO. 1
PA NO. 31-049

Mine Name: Cajun Queen #1 PA# 31-049
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-049-TP1-A		14426.5	3562.19	2221.6			6880.2			73.2944 *		24.3774
31-049-TP1-B		8163.26	2697.36	1863.8			3862.45			37.9474 *		28.106
31-049-TP-1-COMP		9418.29	3084.62	1761.17		260.567 *	5449.53			54.331 *		21.0746
31-049-WR-1		14430.6	7364.19	2070.53	127.56 *	601.575 *	9908.91			340.935		24.0221
31-049-WR-1-COMP		15584.7	5234.26	1966.13		436.12 *	10298.6		39.518 *	139.544		17.8571
31-049-WR-2		18934.2	4788.98	2141.6		682.785 *	15845.9			149.873		26.9301
31-049-WR-3		18282.6	8121.97	2300.87			7799.33			95.9278 *		21.715
31-049-WR-4		11638.6	3398.48	2133.6		490.461 *	10164.6			116.857 *		33.7734

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-049-TP1-A	229.17			77.2491	57.2309			109.437		12.3995 *	19.7662 *
31-049-TP1-B	223.699			78.8165	24.6211 *			75.0769		15.8844 *	22.0793 *
31-049-TP-1-COMP	218.334			91.169	55.5044			128.814		9.05778 *	15.9854 *
31-049-WR-1	255.251			89.219	87.8884			163.244		18.5553 *	18.7874 *
31-049-WR-1-COMP	289.067			73.4383	107.361			190.443			20.7396 *
31-049-WR-2	282.74			174.882	127.177			203.409		15.9605 *	22.6358 *
31-049-WR-3	336.633			69.7009	125.805			234.838		20.381 *	33.1567
31-049-WR-4	228.198			65.1475	96.4702			177.751			20.6411 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

CAJUN QUEEN NO. 1
PA NO. 31-049

AIMSS SCORESHEET

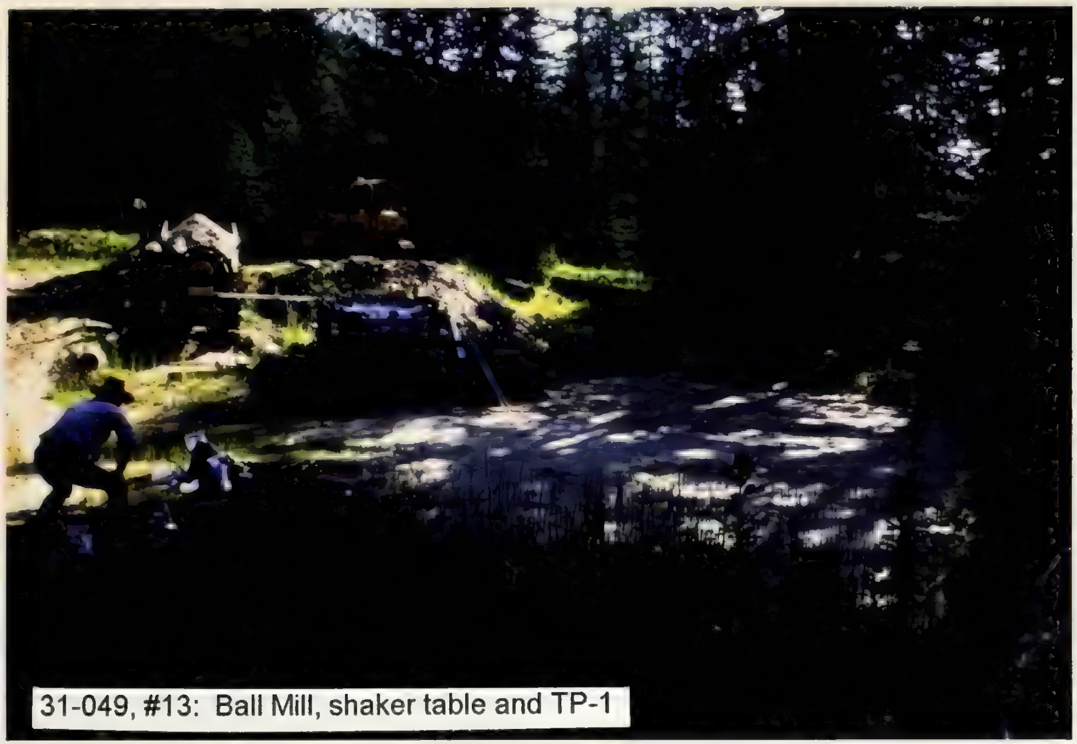
SITE NAME: CAJUN QUEEN NO. 1
PA NUMBER: 31-049

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.089
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.102
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19	SW - TARGETS	FISHERY		10
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	20
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	816
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.011
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	15
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	8
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.010
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.01**

SITE NAME: CAJUN QUEEN NO. 1
PA NUMBER: 31-049

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	240
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



31-049, #13: Ball Mill, shaker table and TP-1

31-049, #14: Recent open cut

31-049, #15: Old waste rock below recent cut

31-049, #16: Lower caved adit area

IRON MOUNTAIN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: IRON MOUNTAIN MILLSITE **PA#:** 31-010

Date: July 22, 1993 **Time:** 1210-1830

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: Earl McCurley, MDSL
Steve Cutler, MDHES
Frank Maciosek, ASARCO

Weather/Seasonality Observations: Cloudy with occasional rain; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #20: Flowing adit; #21-#23: WR-1; #24,#25: Mill foundation; #26: Mill remains and TP-1; #27,#28: TP-2 along Flat Creek.
Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Mill tailings are coarse to fine along the floodplain for miles. Flat Creek has a pH of > 8.0 and fish were observed during investigation.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Contain fine mill tailings on-site which are moving to Flat Creek. Tailings that are in the floodplain downstream should be pulled out and vegetated. Route discharging adit around WR-1 pile; smooth slopes and revegetate dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): IRON MOUNTAIN MILLSITE PA#: 31-010

Legal Description: T 17N ;R 26W ;Sec. 13 , NE1/4NW 1/4 ___1/4

County: MINERAL Mining District: IRON MOUNTAIN

Latitude: N 47° 14' 25" Longitude: W 114° 51' 10"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Flat Creek

USGS Quadrangle map name(s): Idaho Gulch

Mine Type/Commodities: Millsite/Copper, Lead, Gold, Silver, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known Y X N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): ASARCO, Inc., Box 440, Wallace, ID 83873-0440; Lolo National Forest.

Relationship to other mines/sites in the area/district: Downstream from Belle of the Hills and Dillon Millsite.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3400', Slope Flat,
Aspect Southeast

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 2 acres.
Dimensions: < 1 acre of mill and tailings; 1 acre of waste rock dumps.

Predominant vegetation types: Cedar, spruce, fir, willow

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

I. BACKGROUND INFORMATION

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Mine/Site Name(s): IRON MOUNTAIN MILLSITE PA#: 31-010

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Past Reclamation Activities? N/A

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Area of disturbed/unvegetated lands? 2 acres.
Dimensions: < 1 acre of mill and tailings; 1 acre of waste rock dumps.

Predominant vegetation types: Cedar, spruce, fir, willow

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Occurs in Wallace Formation; Site lies at junction of Hall Gulch (dry) and Flat Creek which flows 3 to 4 miles to the Clark Fork River.

Mining/milling history, ore type/tenor, host rock, gangue: Ore minerals occur as vein fillings in schistose Belt rocks. Minerals are galena, sphalerite, aregentian tetrahedrite, arsenopyrite, pyrite, marcasite, and quartz. Two periods of production: 1909-1930 and 1947-1953.

Mine Operation?

Shafts -	Yes X	No	# 1	Comment 500 feet (did not find during this investigation
Adits -	Yes X	No	# 1	Comment Flowing
Pits -	Yes	No X	#	Comment
Placers -	Yes	No X	#	Comment
Other -	Yes	No X	#	Comment

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: 1909-1930 and 1947-1953

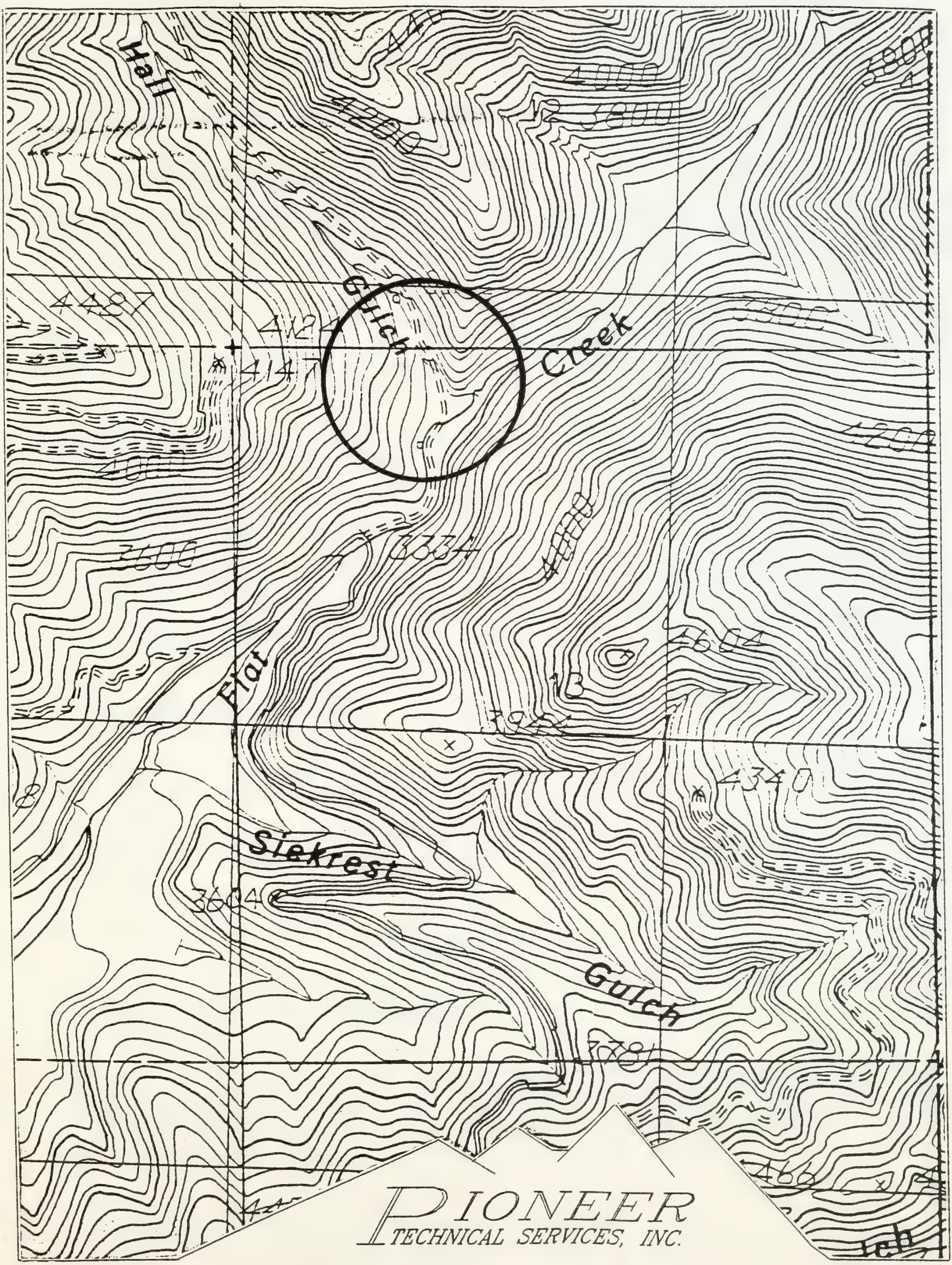
Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed: Area mines: Belle of the Hills, Dillon Millsite, and Iron Mountain

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Possibly floatation; there were two separate milling operations: the first (early) flushed tailings downstream, and the later operation possibly contained the tailings on-site; however, there was no evidence of significant volumes of tailings except those along the floodplain.

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

Well No.	Location	Depth	Yield	Static Water Level
M:73123	17N 26W 11 DBD	60.0	75.0	20.00
M:73124	17N 26W 13 CC	225.0	40.0	115.00



PIONEER
TECHNICAL SERVICES, INC.

IRON MOUNTAIN, P.A. NO. 31–010

T17N, R26W, SECTION 12
SCALE: 1" = 1000'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): TP-1, fine sand/silt/clay; TP-2, gravel 60%/fines 40%/clay/silt.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): No impoundments

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): No impoundments

Comments on potential for mitigation: Easy to isolate/remove small amount of tailings around mill eroding to Flat Crk.; TP-2 in floodplain for 3 miles downstream, some revegetation occuring naturally, may not need mitigation.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	6,500	Northeast section of WR-1 on top	None	6.9 (D)	0.045	31-010-WR-1	07/22/93 1830	T-Metals, ABA
WR-1B	WR		East side of WR-1	None	6.4 (D)	0.045			
WR-1C	WR		Southwest side of WR-1 on top	None	6.8 (D)	0.06			
TP-1A-1	TAIL	140	Below mill foundation next to creek; 0-20", orange/yellow silt	None	3.5 (D)	0.03	31-010-TP-1	07/22/93 1800	T-Metals, ABA
TP-1A-2	TAIL		Below mill foundation next to creek; 20"-32", gray clay/sand	None	< 3.5 (D)	0.04			
TP-1B-1	TAIL		Above mill; 0-36", orange/yellow/gray sand/silt/clay	None	< 3.5 (D)	0.03			
TP-2A	TAIL	228	Coarse red tails that run downstream along Flat Creek below mill	None	5.7 (D)	0.03	31-010-TP-2	07/22/93 1815	T-Metals, ABA
TP-2B	TAIL		1/4 mile downstream Flat Creek	None	6.8 (D)	0.05			
TP-2C	TAIL		1/2 mile downstream Flat Creek	None	6.8 (D)	0.05			
TP-2D	TAIL		0.8 mile downstream Flat Creek	None	6.0 (D)	0.04			
TP-2E	TAIL		1.2 miles downstream Flat Creek	None	6.6 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-010-WR-1 is composite of WR-1A through -1C. 31-010-TP-1 is composite of TP-1A-1 and -1A-2, and TP-1B-1. 31-010-TP-2 is composite of TP-2A through -2E.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: GW-1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 72

Distance to nearest well used for drinking? Possibly at residence located 1.1 miles downstream from the site.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
High pH of tailings and waste rock and low metals concentrations.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit discharge into Hall Gulch	10 gpm (E)	6.51	920	40.7	12.5	318.8	N/A	31-010-GW-1	07/22/93 1330	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Flat Creek flows southwest 3.5 miles to the Clark Fork River.

Dry streambeds: Yes X, No ___, Name(s): Hall Gulch flows southeast to Flat Creek.

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-2 in Flat Creek; WR-1 in Hall Gulch.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 2.4 during investigation
High Flow: 20 cfs, Average Flow: 2 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Adit discharges onto WR-1; Flat Creek flows through TP-2 floodplain tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Alleged water supply from Flat Creek; Clark Fork River has fishery, recreation, irrigation, agriculture, wetlands, and T&E - Bald Eagle.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 3 mi Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): TP-2 in floodplain for 3 miles downstream.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Flat Creek below millsite	8.27	330	165.2	7.6	144.7	--	31-010-SW-1	07/22/93 1800	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Flat Creek below millsite	N/A	N/A	N/A	N/A	N/A	N/A	31-010-SE-1	07/22/93 1800	T-Metals
SW-2	SW	Flat Creek above millsite	8.37	310	160.2	8.5	135.6	2.4 cfs (M)	31-010-SW-2	07/22/93 1530	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Flat Creek above millsite	N/A	N/A	N/A	N/A	N/A	N/A	31-010-SE-2	07/22/93 1530	T-Metals
SE-3	SE	Hall Gulch below WR-1	N/A	N/A	N/A	N/A	N/A	N/A	31-010-SE-3	07/22/93 1345	T-Metals
SE-4	SE	Hall Gulch above WR-1	N/A	N/A	N/A	N/A	N/A	N/A	31-010-SE-4	07/22/93 1400	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres

Wetlands present: Yes X **, No**___**, Describe:** Flat Creek

Carbonate rocks/soils: Yes X **, No**___**, Describe:** Wallace Formation

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___**; 10-30**___**; 30-100**___**; 100-300**___**; 300-1,000** X **; 1,000-3,000**___**; 3,000-10,000**___**; 10,000 or greater**___**; Comments**___

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX; Sulfides	Dry	24,840	24,840	Yes	Low
TP-1	FEQX; pH	Dry	1,350	1,350	Yes	Moderate
TP-2	FEOX	Dry	6,165	4,932	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Shooting; two tourist cars were observed during investigation.

Accessibility - Fences, warning signs, closed roads? Unrestricted; mill is right alongside the road.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations: A shaft was reported on top of the hill during the previous investigation, but was not observed.

Hazardous structures: Yes___, No_X_, Number____, types and locations:________________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations: WR-1 is very steep.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Title Unknown, Mineral County, Iron Mountain District, Bulletin No. 30, Date Unknown, p. 31.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

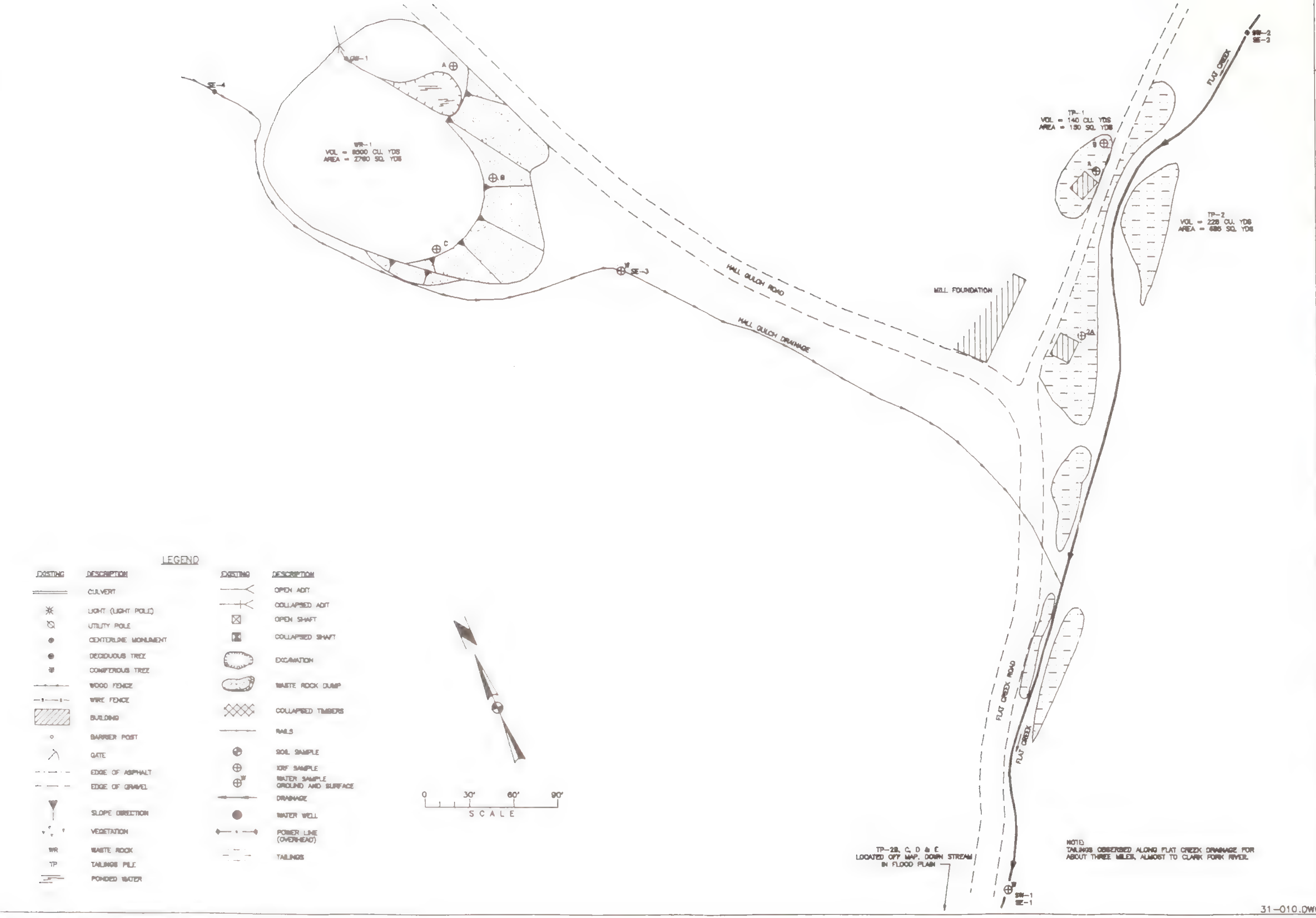
MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Iron Mountain Millsite, Prepared by Northern Engineering and Testing, July 10, 1988.

MDSL/AMRB Files, Iron Mountain Mine, Mineral County, Iron Mountain District.

MDSL, Results of Conversation or Discussion between John Koerth, DSL, and Jim Shultz, March 3, 1993.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-I, Author Unknown, Date Unknown, pp. 589-590.

USGS, Topographic Map, Idaho Gulch, Montana, 7 1/2 minute Quadrangle, 1985.



TP-2B, C, D & E LOCATED OFF MAP, DOWN STREAM IN FLOOD PLAIN

NOTE:
TAILINGS OBSERVED ALONG FLAT CREEK DRAINAGE FOR ABOUT THREE MILES, ALMOST TO CLARK FORK RIVER.

31-010.DWG

SHEETS

SHEET NO.

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

IRON MOUNTAIN MILL PA# 31-010
IRON MOUNTAIN DISTRICT MINERAL COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

LABORATORY ANALYTICAL DATA

IRON MOUNTAIN MILLSITE
PA NO. 31-010

Iron Mountain Mill PA# 31-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-010-SE-1	428	46.4	27.5	5.5	1.6 U	51.3	32100	7.46	1800 J	7	7270	353	6240	NR
31-010-SE-2	15	58.7	0.5 U	3.9	1.5 U	8.6	12400	0.014 U	312 J	6	48	7 U	116	NR
31-010-SE-3	231	191	3.3	24.1	3.8	25.5	20300	0.652	3950 J	65	730	46	4110	NR
31-010-SE-4	18	49.1	0.5 U	6.9	1.7	12.6	9730	0.057	231 J	6	92	6 U	122	NR
31-010-TP-1	1470	5	210	2.8	5.4	319	36800	32.6	2080 J	3	13500	3970	44600	NR
31-010-TP-2	2120	3.2	43.3	1.5 U	1 U	68	54000	6.66	2010 J	2 U	12700	2390	8990	NR
31-010-WR-1	82	3.7	0.5 U	8.1	1.4 U	19.4	30600	0.498	2780 J	15	152	28	787	NR
BACKGROUND	13	257	0.5 U	8.5	2.7	15.5	17200	0.012 U	448 J	10	17	6 U	64	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-010-TP-1	2.53	79	4.2	-74.	0.52	0.48	1.53	15	-10.8
31-010-TP-2	1.52	47.5	6.67	-40.	0.7	0.2	0.62	6.25	0.42
31-010-WR-1	0.11	3.44	139	136	<0.01	0.03	0.09	0.94	138

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31-010-GW-1	302	38.4 JX	2.57 U	9.7 U	6.83 U	2.7 J	1620 J	0.038 U	4850	30.2	1.9 J	30.7 U	3850 J	486
31-010-SW-1	5.53	40.7 JX	2.57 U	9.7 U	6.83 U	2.63 J	26.7 J	0.038 U	4.08 U	12.7 U	2.97 J	30.7 U	266 J	150
31-010-SW-2	3.63	40.2 JX	2.57 U	9.7 U	6.83 U	1.57 J	41.3 J	0.038 U	4.08 U	12.7 U	1.2 J	30.7 U	7.57 U	138

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
31-010-GW-1	612	< 5.0	183	< 0.05	NR
31-010-SW-1	195	< 5.0	8	< 0.05	NR
31-010-SW-2	203	< 5.0	< 5.0	0.1	NR

LEGEND

SE1 – Flat Creek below millsite.
SE2 – Flat Creek above millsite.
SE3 – Hall Gulch below waste rock dump 1.
SE4 – Hall Gulch above waste rock dump 1.
TP1 – Composite of subsamples TP1A1, 1A2, and 1B1.
TP2 – Composite of subsamples TP2A through 2E.
WR1 – Composite of subsamples WR1A through 1C.
BACKGROUND – From the Dillon Millsite (31-073-SS-1).
GW1 – Adit discharge into Hall Gulch.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

IRON MOUNTAIN MILLSITE
PA NO. 31-010

Mine Name: Iron Mountain Mill PA# 31-010
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-010-TP1A-1		9494.44	1935.73	637.506		1188.99	30435.9		127.137 *	13982	350.285 *	11.4353 *
31-010-TP1A-2		23099.1	3927.3	882.678		2931.97	27765.1		247.84	48089.1	544.022 *	20.6627 *
31-010-TP1B-1	317.153 *	14418.1	3387.68	840.35		1267.84	29810.1		136.609 *	23274.2		30.2154 *
31-010-TP2-A		22940.6	3171	827.55		678.761 *	38155.1			12879.6	1595.67	26.7091 *
31-010-TP2-B		18476.8	2947.17	1298.05		4232.19	63487.8		60.1924 *	2687.5	2492.58	29.8017 *
31-010-TP2-C		13853.8	3264.95	1478.58		3111.25	59684.2			1017.05	2992.53	32.5236 *
31-010-TP2-D		14598.1	3689.82	1850.73		1741.52	64159.7			2855.12	1028.1	36.6072
31-010-TP2-E		9914.34	3408.69	1476.17		3476.83	84690.1			6551.4	2762.98	40.9312
31-010-TP-1-COMP		16418.5	3406.47	798.379		1833.94	29450.1		229.379	29400.1		20.3004 *
31-010-TP-1-COMP-DUP		19220.7	3916.9	920.026		1908.91	30168.9		229.715	27792.9	259.466 *	31.9056 *
31-010-TP-2-COMP		17673.3	3297.2	1501.91		2310.87	62252.5			4842.76	1909.6	29.754 *
31-010-WR1-A		35735.4	31264.7	2072.04		2363.07	18518.3			2472.04	91.7885 *	149.599
31-010-WR1-B		26613	40882.7	1667.95		358.998 *	22183.7		44.8469 *	222.857		52.3055
31-010-WR1-C		40803	11766.3	2092.75		4411.9	25950.3			831.366		89.5062
31-010-WR-1-COMP		35983.6	21590.9	1768.82		2886.36	21852.5			1043.84		98.5268

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-010-TP1A-1	66.1227	55.1667 *		4644.2	50.3875		1644.04	72.4806 *			
31-010-TP1A-2	102.254	91.0663 *		5784.89	120.844	403.455 *	2446.5	339.746	184.96 *		
31-010-TP1B-1	94.4215	76.8774 *		12232.4	79.1902		6125.41	142.437			31.0677 *
31-010-TP2-A	120.748	62.7363 *		7644.3	108.336		2763.18	168.249	105.387 *		25.5136 *
31-010-TP2-B	123.579	51.8097 *		8782.32	110.806		1745.14	172.039	148.797 *		17.8912 *
31-010-TP2-C	136.889			10535.4	87.2153		2388.4	143.318	246.815 *		23.0782 *
31-010-TP2-D	127.864	47.9492 *		10738.6	93.4544		3197.81	149.451	276.097 *		
31-010-TP2-E	109.778	58.92 *		10991.3	86.0093		2702.7	118.93	160.877 *		
31-010-TP-1-COMP	98.1156	75.5909 *		8929.83	91.016	300.57 *	3929.18	171.484	172 *		21.7538 *
31-010-TP-1-COMP-	93.3384	124.767 *		8005.31	102.161	310.317 *	3978.44	198.038	194.397 *		29.013 *
31-010-TP-2-COMP	137.5	63.6564 *		10170	105.285		2721.02	139.996	231.38 *		
31-010-WR1-A	204.955	36.6865 *		246.444	170.79		86.8712 *	2084.65		16.3509 *	15.5045 *
31-010-WR1-B	186.538	38.3183 *		46.8963 *	167.04			383.998		17.2567 *	9.18215 *
31-010-WR1-C	246.136	36.5249 *		93.4367	210.55		71.5767 *	1095.95		14.2367 *	13.4666 *
31-010-WR-1-COMP	206.479			183.666	172.514		94.4637 *	1093.69		21.7616 *	11.5752 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

IRON MOUNTAIN MILLSITE
PA NO. 31-010

AIMSS SCORESHEET

SITE NAME: IRON MOUNTAIN MILLSITE
PA NUMBER: 31-010

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	8.139
6		WELLS - 1 MI. x 2.5		5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		70
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	75.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	122085

SURFACE WATER PATHWAY

LINE NO.				
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	8.504
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		16
18		WETLANDS		10
19	SW - TARGETS	FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	43
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	274254

AIR PATHWAY

LINE NO.				
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.418
29		POPULATION - 4 MILES		300
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	315
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	9875

DIRECT CONTACT PATHWAY

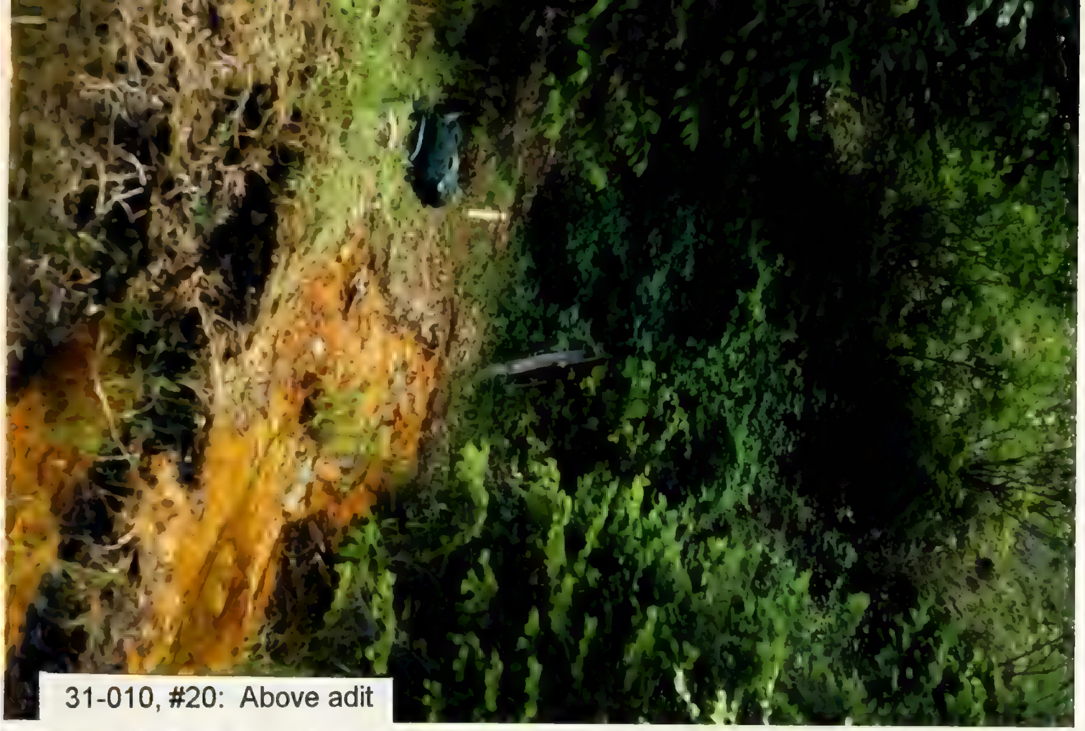
LINE NO.				
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.387
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	348

LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**4.07**

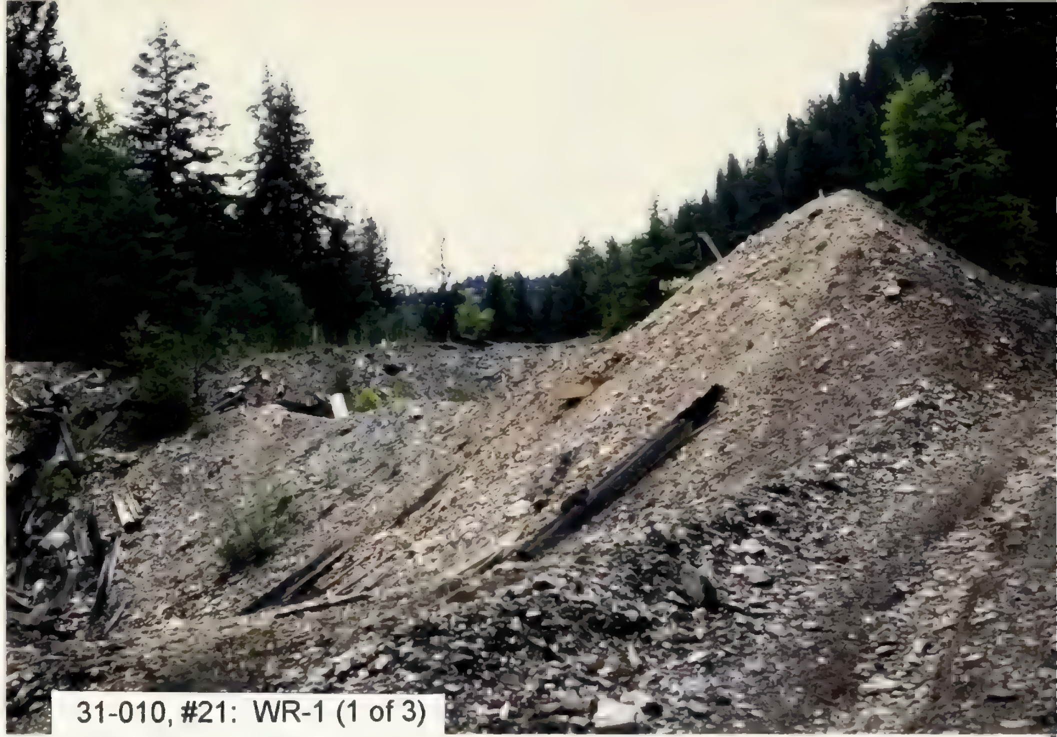
SITE NAME: IRON MOUNTAIN MILLSITE
PA NUMBER: 31-010

SITE SAFETY

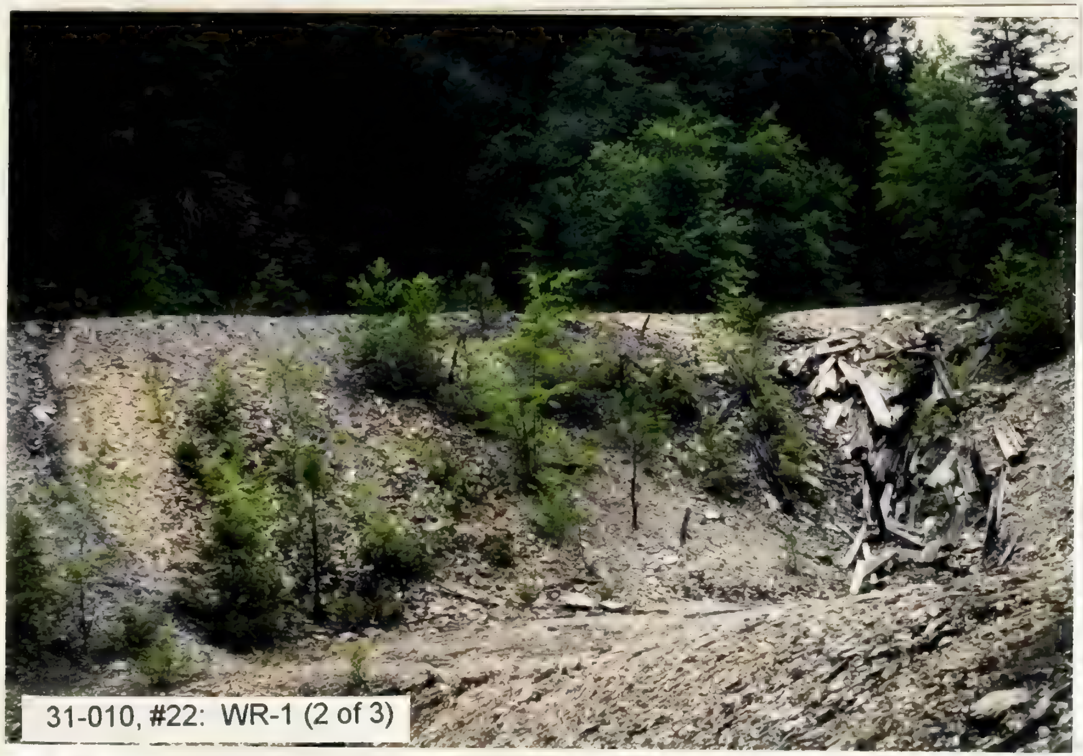
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



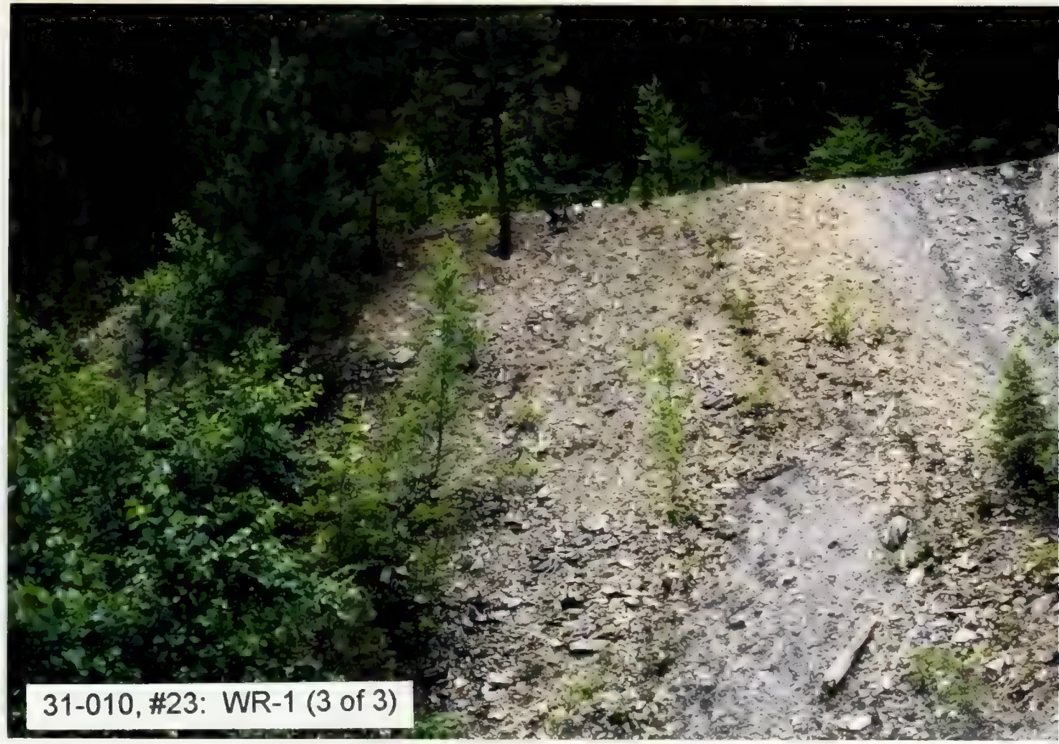
31-010, #20: Above adit



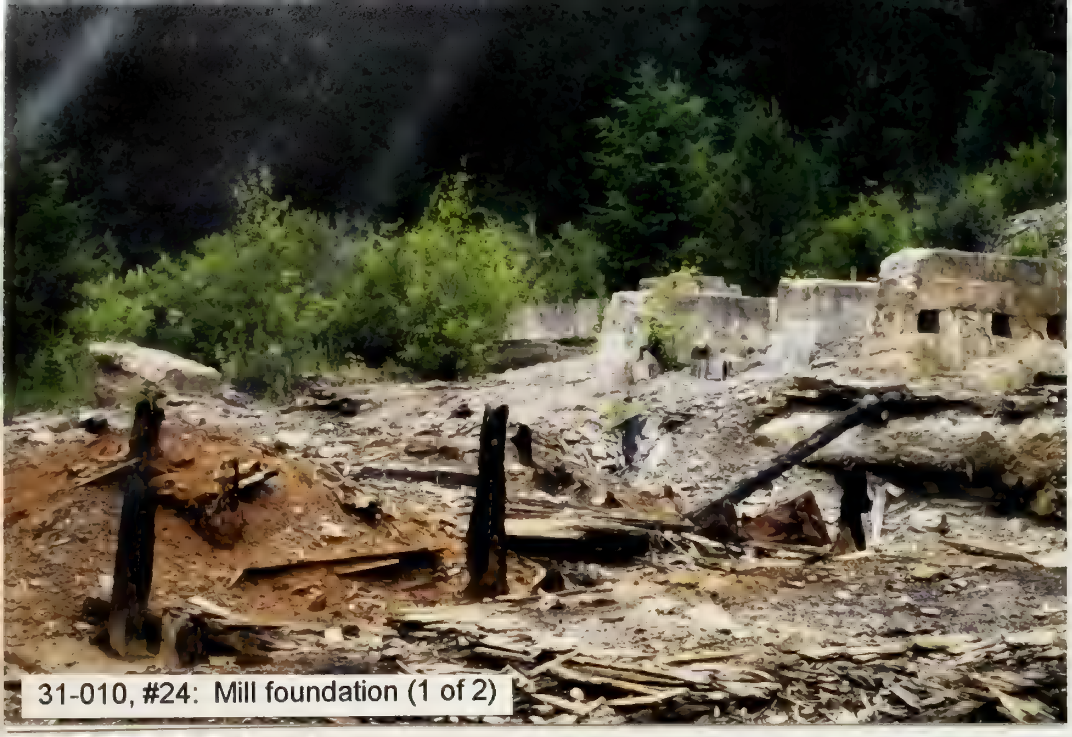
31-010, #21: WR-1 (1 of 3)

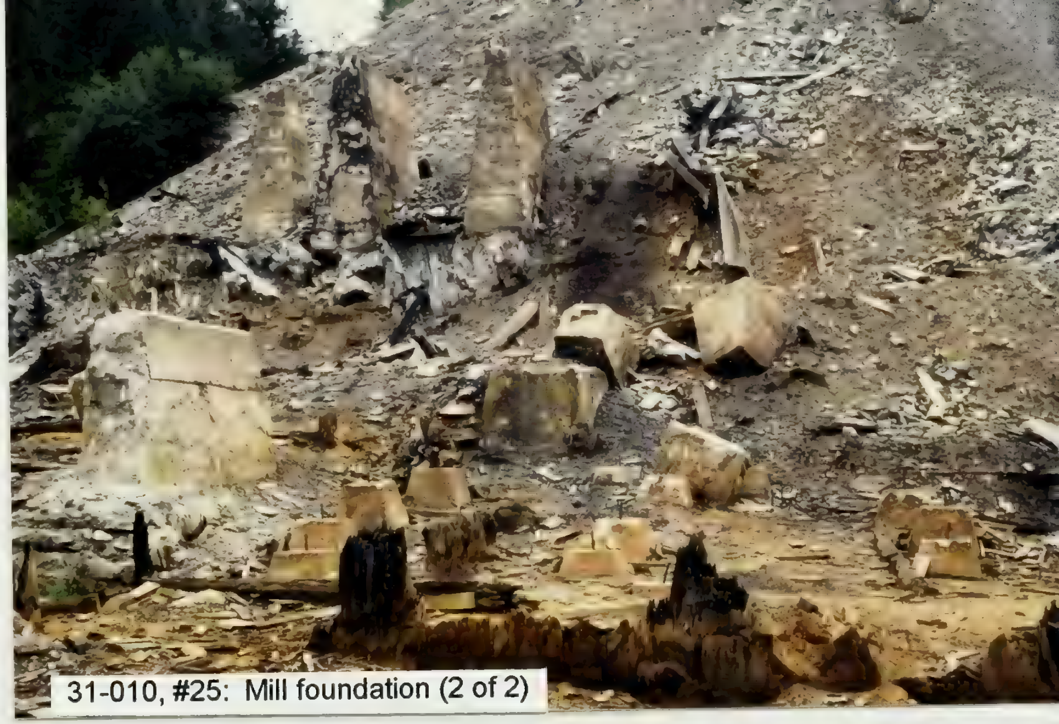


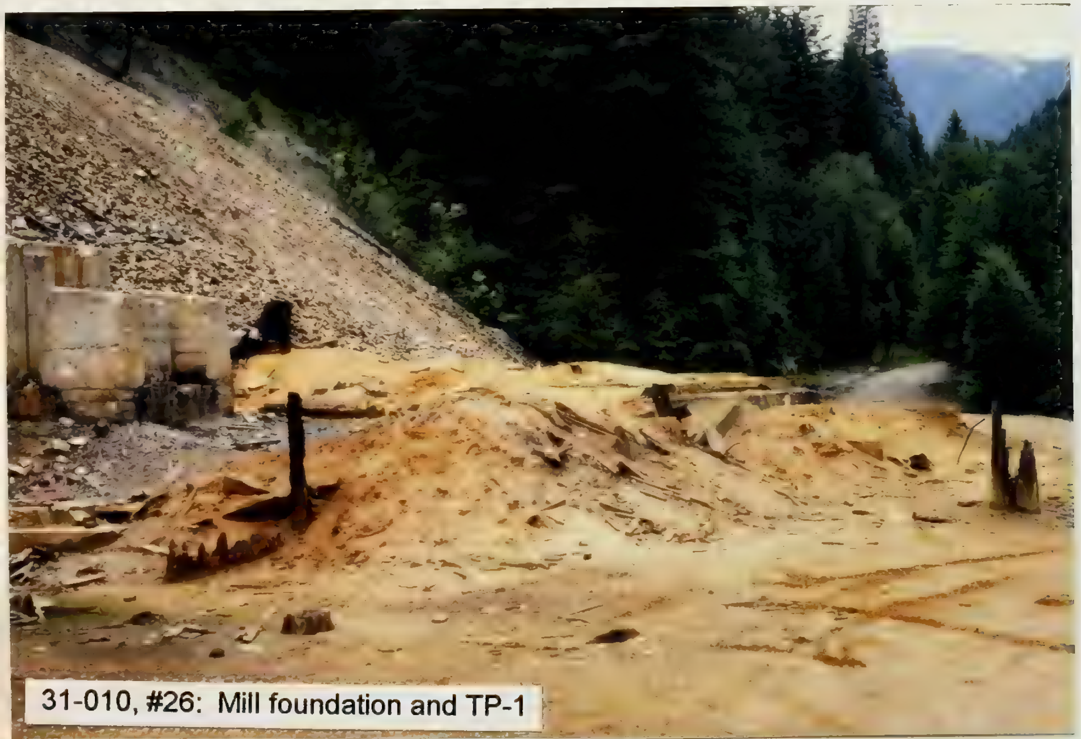
31-010, #22: WR-1 (2 of 3)

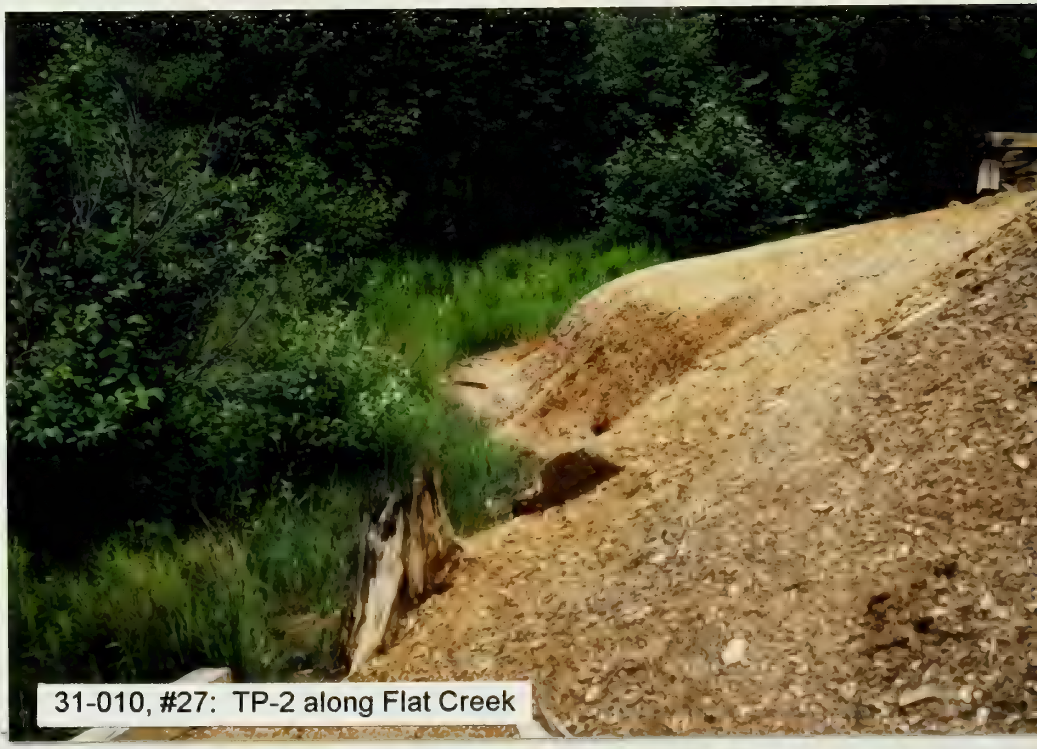


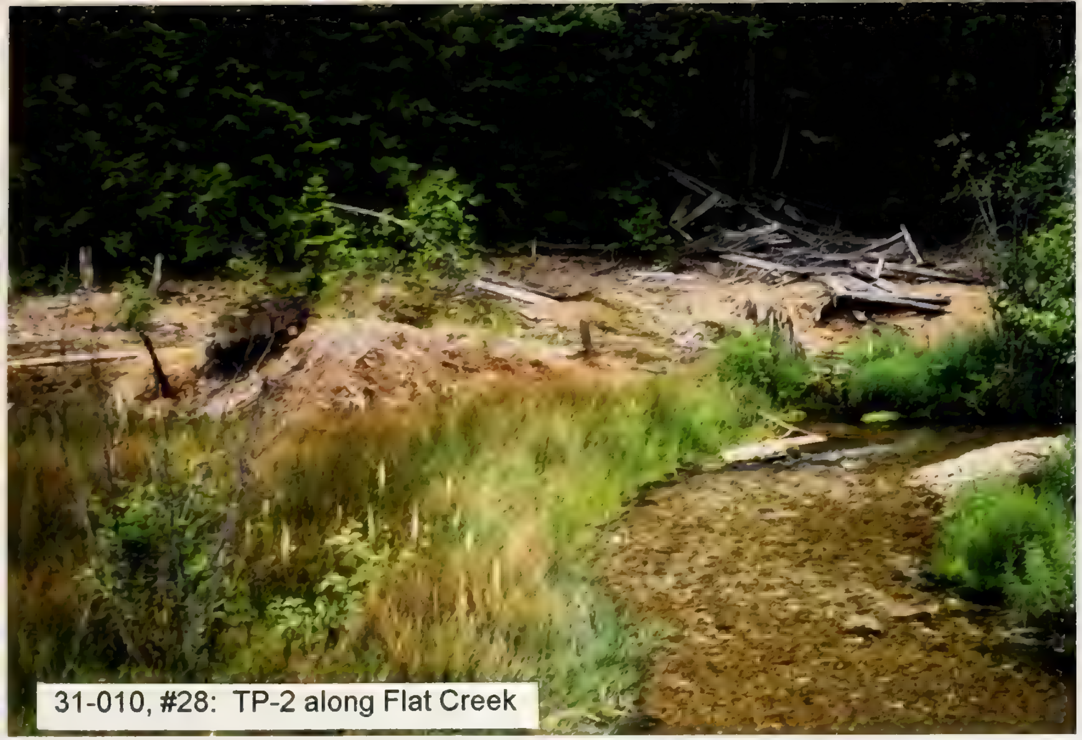
31-010, #23: WR-1 (3 of 3)


31-010, #24: Mill foundation (1 of 2)


31-010, #25: Mill foundation (2 of 2)


31-010, #26: Mill foundation and TP-1


31-010, #27: TP-2 along Flat Creek



31-010, #28: TP-2 along Flat Creek

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: GOLD KING PA#: 31-067

Date: August 2, 1993 Time: 1800-2000

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; 75°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #10: Adit portal; #11: WR-1. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): No background sample taken because no pathways or receptors are present.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: None

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GOLD KING PA#: 31-067

Legal Description: T 16N ;R 24W ;Sec. 20 , SE1/4SW 1/4 ___1/4

County: MINERAL Mining District: IRON MOUNTAIN

Latitude: N 47° 07' 30" Longitude: W 114° 39' 45"

Primary Drainage Basin and Code: South Fork Deep Creek/17010204
Secondary Drainage Basin: Malley Gulch

USGS Quadrangle map name(s): Tarkio

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Ray Dey, 874 Hwy 200, Noxon, MT 59853. (406) 847-2354; Lolo National Forest.

Relationship to other mines/sites in the area/district: Several other claims are located in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Small amounts of exploration work has been conducted.

General site features: Elevation 5600' , Slope 33° ,
Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.05 acres.
Dimensions:

Predominant vegetation types: Douglas fir, mountain maple, raspberry, and strawberry

Access: roads - good___,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites). Locked gate at bottom of road in Deep Creek; approx. 1.2 mile walk.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Mine site sits approx. 800 feet above Malley Gulch, a tributary of Deep Creek. The site is underlain by argillites and quartzites.

Mining/milling history, ore type/tenor, host rock, gangue: No historical information available. Galena and pyrite are in dumps with manganese dendrites; appears to be quartz vein material in the dumps.

Mine Operation?
Shafts - Yes___, No X , # ____, Comment____
Adits - Yes X , No___, # 1 , Comment Open (HMO)
Pits - Yes___, No X , # ____, Comment____
Placers - Yes___, No X , # ____, Comment____
Other - Yes___, No X , # ____, Comment____

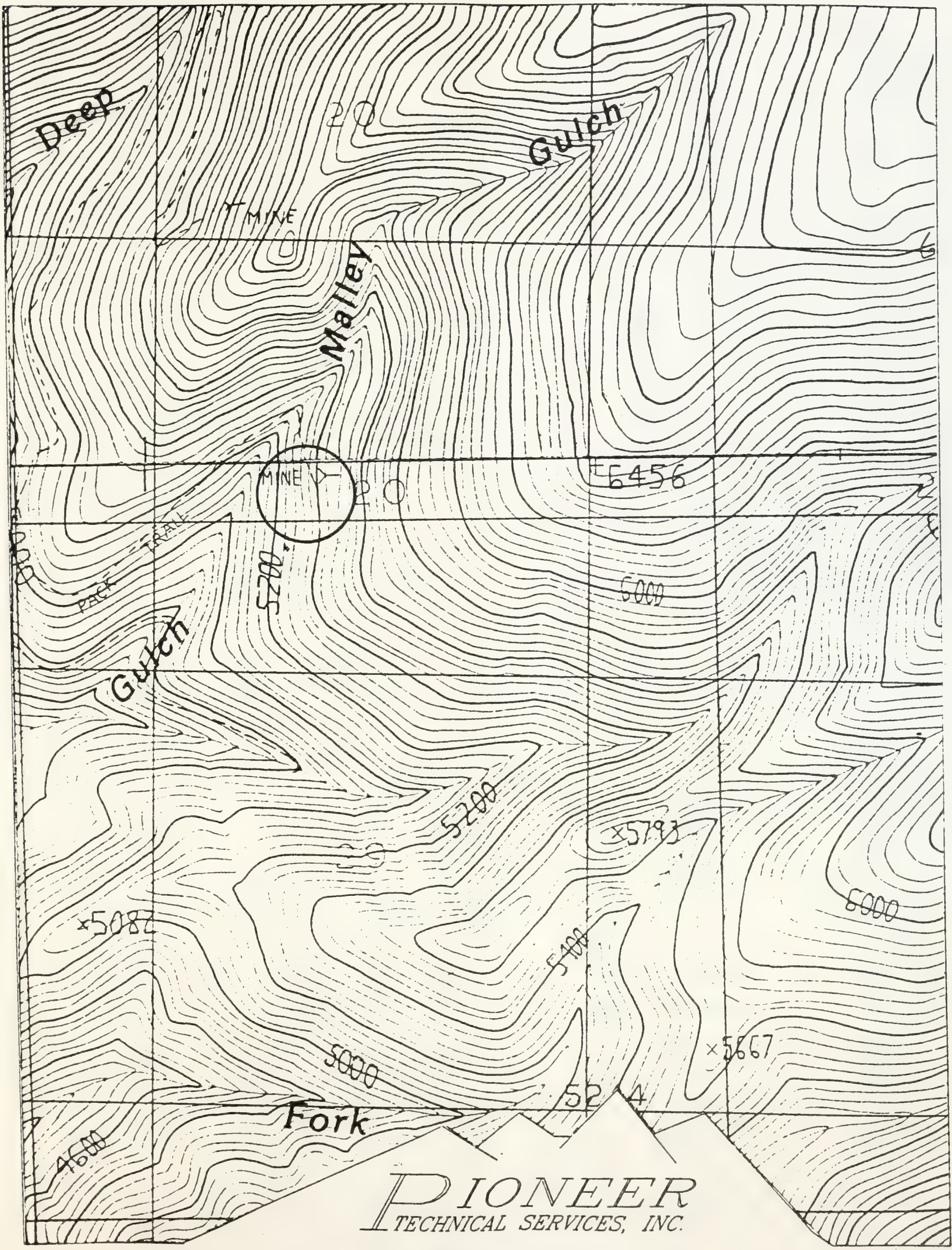
Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

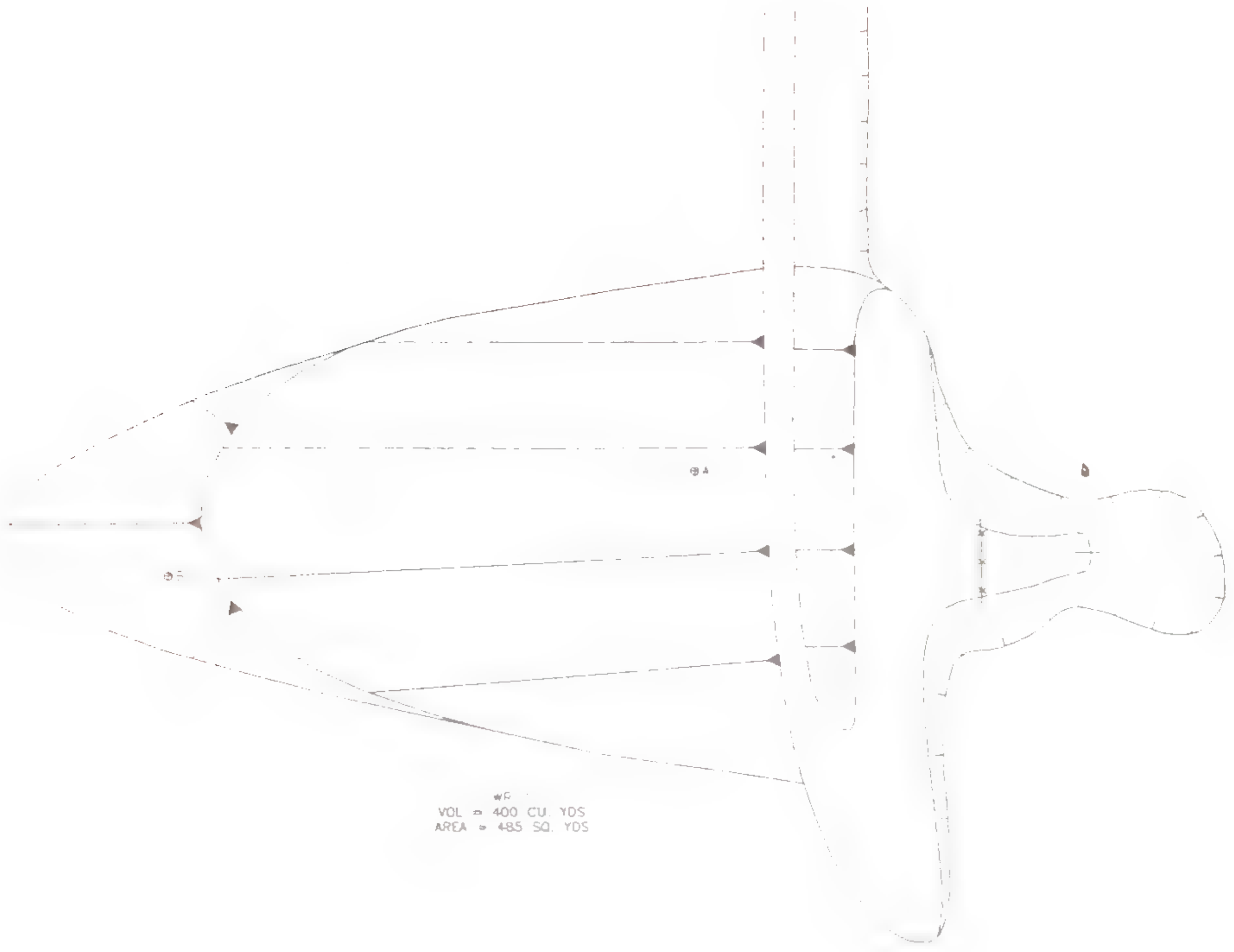
No.	Location	Depth	Yield	Static Water Level
783	16N 24W 19	120.0	35.0	96.00

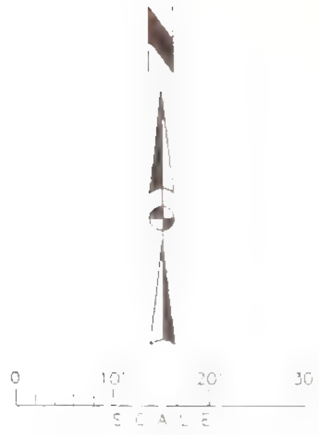


PIONEER
TECHNICAL SERVICES, INC.

GOLD KING, P.A. NO. 31-067

T16N, R24W, SECTION 20
SCALE: 1" = 1000'





LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
======	CULVERT	——<	OPEN ADIT
☼	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
○	UTILITY POLE	⊡	OPEN SHAFT
●	CENTERLINE MONUMENT	⊠	COLLAPSED SHAFT
●	DECIDUOUS TREE	◯	EXCAVATION
✱	CONIFEROUS TREE	◯	WASTE ROCK DUMP
—•—•—	WOOD FENCE	⁘	COLLAPSED TIMBERS
—•——•—	WIRE FENCE	—+—+—	RAILS
▨	BUILDING	◐	LAB SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⌒	GATE	⊕	WATER SAMPLE GROUND AND SURFACE
— - —	EDGE OF ASPHALT	—◆—◆—	DRAINAGE
— — —	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	○—·—◇	POWER LINE (OVERHEAD)
⁖	VEGETATION	- – -	TAILINGS
WR	WASTE ROCK		
TP	TAILINGS PILE		

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS BOZEMAN KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

GOLD KING PA# 31-067
IRON MOUNTAIN DISTRICT MINERAL COUNTY

1

SHEET NO.
1

31-067.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	400	Near top of dump; red/orange sand	None	7.0 (D)	0.03	31-067-WR-1	08/02/93 2255	T-Metals, ABA
WR-1B	WR		Near bottom of dump; red/orange sand	None	6.95 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-067-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 7

Distance to nearest well used for drinking? Approx. 3.5 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Waste rock metals concentrations are low; no water on or near the site.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Malley Gulch drainage is approx. 800 feet below mine; no direct runoff pathway.

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
Approx. 800 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain(Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

*FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 3.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR	None	Dry	4,365	2,180	No	None

Notes and Clarifications:

MDSL AMRB/PIONEER 4/9/93

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None____

Evidence of recreational use on site: Yes___, No_X_, Describe:________
____

Accessibility - Fences, warning signs, closed roads?_Closed road____
with gate approx. 1.2 miles from site.___________________________

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________________
Wilderness Area - Yes___, No_X_, Comment__________________
T&E Species Habitat - Yes_X_, No___, Comment_Bald Eagle__________
Bat Habitat - Yes_X_, No___, Comment_Open adit___________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1__, types and locations:___
Adit is open.____
____

Hazardous structures: Yes___, No_X_, Number____, types and locations:_
____
____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____
____
____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:_________________________________
____
____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________
____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Gold King, Prepared by Northern Engineering and Testing, July 12, 1988.

USGS, Topographic Map, Tarkio, Montana, 7 1/2 minute Quadrangle, 1983.

LABORATORY ANALYTICAL DATA

GOLD KING
PA NO. 31-067

Golg King PA# 31-067
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–067–WR–1	4.79 U	2440	0.52 U	2.74	1.39 U	26.1	19200	0.715	515	7.86	8.21 U	6.23 U	6.52	NR
BACKGROUND	13	257	0.5 U	8.5	2.7	15.5	17200	0.012 U	448 J	10	17	6 U	64	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–067–WR–1	0.47	14.7	7.24	–7.45	0.05	0.05	0.37	1.56	5.67

LEGEND

WR1 – Composite of subsamples WR1A and 1B.
BACKGROUND – From the Dillon Millsite (31–073–SS–1).

XRF ANALYSIS RESULTS

GOLD KING
PA NO. 31-067

MDSL AMRB/PIONEER 4/9/93

Mine Name: Gold King PA# 31-067
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-067-WR1-A		25316.1	3203.68	700.143 *	424.043 *	1268.08	40790.4		88.1749 *	65.4102 *	47.4032 *	198.849
31-067-WR1-B		29070.1	2811.64	1182.51	400.108 *	1008 *	33968.6		45.1076 *	55.9294 *	28.7771 *	138.453
31-067-WR-1-COMP		24959.7	2919.17	838.032	219.694 *	979.329 *	34170.1		71.1182 *	48.3496 *	23.7462 *	93.6289

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-067-WR1-A	170.221				103.16			12216.5	88.4764 *	18.133 *	18.4388
31-067-WR1-B	199.287		4.92145 *		134.089			9868			13.725 *
31-067-WR-1-COMP	209.334		4.98003 *		136.455			7105.84			14.0083 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

GOLD KING
PA NO. 31-067

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: GOLD KING

PA NUMBER: 31-067

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		6
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	8.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	6
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	16
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

SITE NAME: GOLD KING
PA NUMBER: 31-067

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

31-067, #11: Adit portal

31-067, #12: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BELLE OF THE HILLS **PA#:** 31-072

Date: July 22, 1993 **Time:** 0900-1030

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: Earl McCurley, MDSL
Steve Cutler, MDHES
Frank Maciosek, ASARCO

Weather/Seasonality Observations: Partly cloudy; cool; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** No photos or video taken because site was too steep and wooded.

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Several dumps on steep hillside; well above drainage (Hall Gulch) but dumps are high in Zn, Pb, and Sb.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Smooth and revegetate dumps; close adits; difficult to remediate because of steep slopes.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BELLE OF THE HILLS PA#: 31-072

Legal Description: T 17N ;R 26W ;Sec. 1 , SW1/4 SW1/4 ___1/4

County: MINERAL Mining District: IRON MOUNTAIN

Latitude: N 47° 15' 20" Longitude: W 114° 51' 20"

Primary Drainage Basin and Code: Flat Creek/17010204
Secondary Drainage Basin: Hall Gulch

USGS Quadrangle map name(s): Quinns Hot Springs

Mine Type/Commodities: Hardrock/Lead, Zinc, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Chris Pfahl, ASARCO, Inc., Box 440, Wallace, ID 83873. (208) 752-1116; Lolo National Forest.

Relationship to other mines/sites in the area/district: Uphill from Dillon Millsite and Iron Mountain Mine/Mill.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4900', Slope Very Steep , Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 4 acres.
Dimensions: 200 feet x 200 feet

Predominant vegetation types: Cedar, Ponderosa pine, fir

Access: roads - good X ,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites). Hall Gulch Road goes through mine area twice (switches back), but must walk to all openings.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the east side of dry Hall Gulch well above the drainage. Water leaving the site would flow into Hall Gulch which flows southeast into Flat Creek approx. 1 mile below. Flat Creek flows southwest 3 1/2 miles to a confluence with the Clark Fork River. The site is underlain by the Wallace and St. Regis Formations of the Precambrian Belt Series.

Mining/milling history, ore type/tenor, host rock, gangue: Veins contain lead and zinc in the Wallace and St. Regis Formations and are associated with the Osburn Fault.

Mine Operation?

Shafts -	Yes X ,	No ___ ,	# 1 ,	Comment 1 HMO (Stope)
Adits -	Yes X ,	No ___ ,	# 7 ,	Comment 4 HMOs
Pits -	Yes ___ ,	No X ,	# ___ ,	Comment
Placers -	Yes ___ ,	No X ,	# ___ ,	Comment
Other -	Yes ___ ,	No X ,	# ___ ,	Comment

Mill Operation? Yes ___ , No X . If yes answer the next three questions:

Period(s) of Operation: N/A

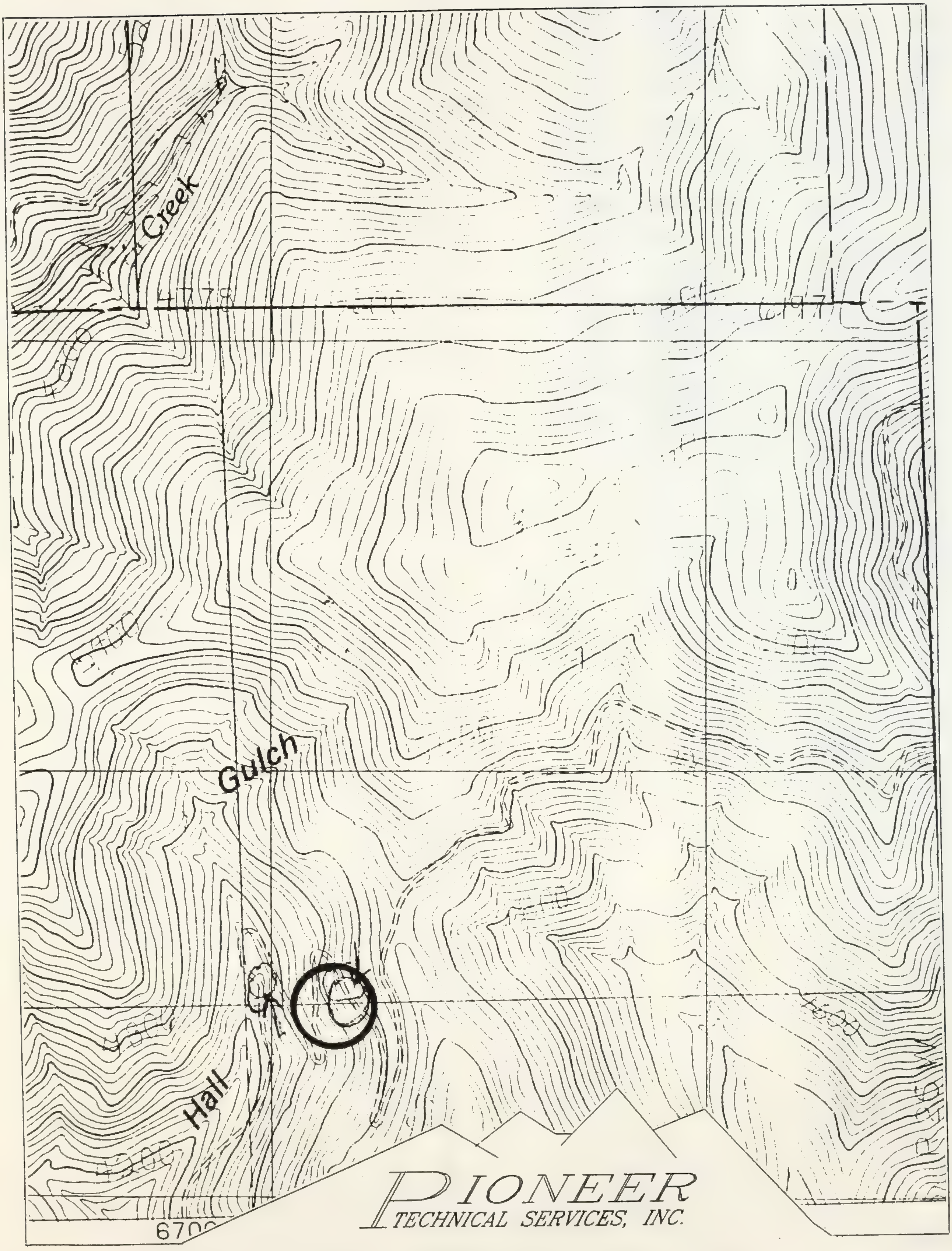
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

No.	Location	Depth	Yield	Static Water Level
3123	17N 26W 11 DBD	60.0	75.0	20.00

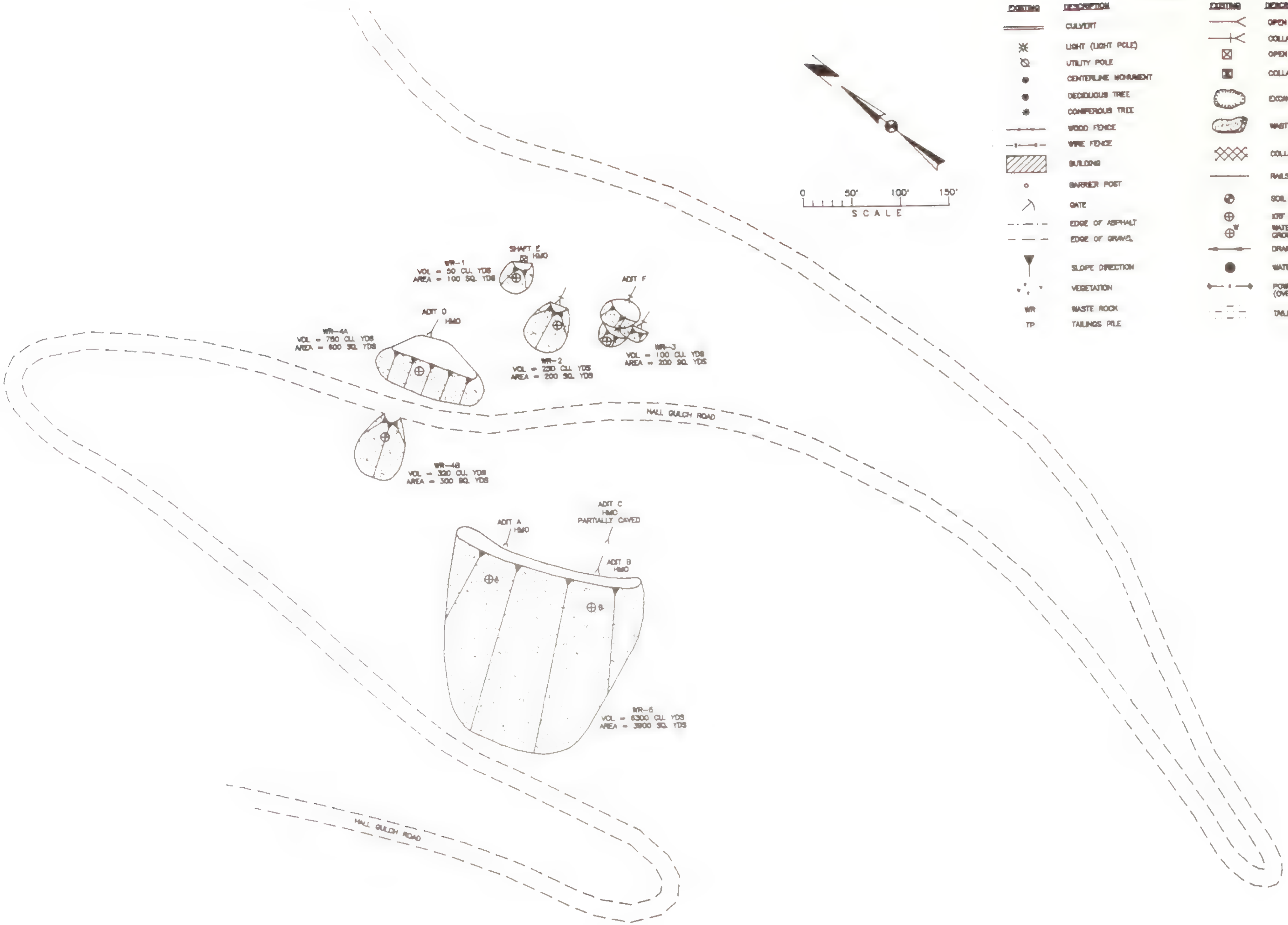


PIONEER
TECHNICAL SERVICES, INC.

BELLE OF THE HILLS, P.A. NO. 31-072

T17N, R26W, SECTION 01

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═	CULVERT	—<	OPEN ADIT
☀	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⊘	UTILITY POLE	☒	OPEN SHAFT
●	CENTERLINE MONUMENT	■	COLLAPSED SHAFT
●	DECIDUOUS TREE	○	EXCAVATION
✱	CONIFEROUS TREE	⬭	WASTE ROCK DUMP
—·—	WOOD FENCE	✕✕✕	COLLAPSED TIMBERS
—x—	WIRE FENCE	—·—	RAILS
▨	BUILDING	◕	SOIL SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⌒	GATE	⊕W	WATER SAMPLE GROUND AND SURFACE
—·—·—	EDGE OF ASPHALT	—◆—	DRAINAGE
— — —	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	◆—·—◆	POWER LINE (OVERHEAD)
∴	VEGETATION	- - -	TAILINGS
WR	WASTE ROCK		
TP	TAILINGS PILE		

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
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MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BELLE OF THE HILLS PA# 31-072
IRON MOUNTAIN DISTRICT MINERAL COUNTY

SHEET NO.

31-072.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	50	Upper most dump to the north	None	6.8 (D)	0.03	31-072-WR-1	07/22/93 1630	T-Metals, ABA
WR-2	WR	250	South of WR-1	None	6.8 (D)	0.06			
WR-3	WR	100	Immediately south of WR-2	None	6.9 (D)	0.04			
WR-4A	WR	750	Below WR-1 through -3 above upper Hall Gulch Road	None	6.7 (D)	0.05	31-072-WR-2	07/22/93 1645	T-Metals, ABA
WR-4B	WR	320	Below upper Hall Gulch Road	None	6.9 (D)	0.04			
WR-5A	WR	6,300	North end of WR-5	None	6.4 (D)	0.03			
WR-5B	WR		South end of WR-5 along lower Hall Gulch Road	None	6.6 (D)	0.045			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-072-WR-1 is composite of WR-1, -2, and -3. 31-072-WR-2 is composite of WR-4A and -4B, and WR-5A and -5B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 44

Distance to nearest well used for drinking? Residence located along Flat Creek approx. 2 miles downstream from this site.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Carbonate dumps; low metals concentrations and steep slopes (deeper groundwater).

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):________________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Hall Gulch approx. 400 feet below the site (elevation).

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
500 feet to Hall Gulch

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Flat Creek is alleged to be drinking water supply. Clark Fork River has wetlands, fisheries, recreation, irrigation, agriculture, and possibly residential.

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None; steep hillside

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Carbonate rocks and soils within dumps (Wallace Formation underlies site).

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles south

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Dry	900	720	Yes	Low
WR-2	FEOX	Dry	1,800	1,440	Yes	Low
WR-3	FEOX	Dry	1,800	1,440	Yes	Low
WR-4	FEOX	Dry	8,100	7,290	Yes	Low
WR-5	FEOX	Dry	35,100	31,590	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:_______

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________
Wilderness Area - Yes___, No_X_, Comment______________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment______________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number 5, types and locations:___ Four adits; one stope (WR-1)

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Belle of the Hills site, Prepared by Northern Engineering and Testing, July 10, 1988.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-L, Author Unknown, Date Unknown.

USGS, Topographic Map, Quinns Hot Springs, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

BELLE OF THE HILLS
PA NO. 31-072

Belle of the Hills PA# 31-072
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-072-WR-1	1230	16.3	102	2.8	1.2 U	243	33400	47.7	2330 J	3	40300	3540	1230	NR
31-072-WR-2	244	6.7	130	2.8	1 U	62	66000	7.8	5580 J	3	10700	785	14100	NR
BACKGROUND	13	257	0.5 U	8.5	2.7	15.5	17200	0.012 U	448 J	10	17	6 U	64	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-072-WR-2	0.64	20	11.7	-8.3	0.14	0.13	0.37	4.06	7.62
31-072-WR-1	0.23	7.19	13.4	6.23	0.17	0.02	0.04	0.62	12.8

LEGEND

WR1 - Composite of subsamples WR1, 2, and 3.
WR2 - Composite of subsamples WR4A, 5A, 4B, and 5B.
BACKGROUND - From the Dillon Millsite (31-073-SS-1).

XRF ANALYSIS RESULTS

BELLE OF THE HILLS
PA NO. 31-072

Mine Name: Belle of the Hills PA# 31-072
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-072-WR4-A		23250.8	2528.14	841.56		3045.46	35476.8	298.431 *	111.639 *	1347.08		24.6873 *
31-072-WR4-B		30178.8	2372.99	1475.15		9130.19	71706.5			2695.34		31.9661 *
31-072-WR5-A		22243	3469.62	1537.47		2499.53	28743.4		159.708 *	4064.93		54.862
31-072-WR5-B		19499.6	1959.27	1149.2		8667.94	67338.9			4653.75		27.94 *
31-072-WR-1	515.074 *	26802.7	4198.45	1589.47		2364.79	29960.3	276.763 *	466.7	959.257		58.2599
31-072-WR-1-COMP	356.241 *	28185.5	3697.04	1474.04		3502.8	38164		198.994 *	1164.42		56.734
31-072-WR-2		29826.6	2311.32	1378.24		3134.13	34298.1		100.836 *	1275.12		33.78
31-072-WR-2-COMP		22771.3	6206.23	1067.56		5261.67	44082.5		78.7938 *	4312.76		43.2596
31-072-WR-3		19767.5	2683.15	1192.24		2694.18	30150.4		72.4355 *	740.654		48.3981

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-072-WR4-A	123.849	100.935 *		9184.18	108.708	157.705 *	2438.29	104.328	120.268 *		25.5609 *
31-072-WR4-B	175.014	75.6719 *		7199.99	142.213		877.6	249.611	177.781 *	11.6136 *	
31-072-WR5-A	160.762	84.1764 *		11414.6	119.737		994.702	291.506	190.669 *		31.2292 *
31-072-WR5-B	110.764	67.5917 *		5783.87	109.281		870.642	139.96	127.064 *		
31-072-WR-1	137.108	91.4144 *		23855.3	113.054	341.217 *	5493.5	254.369	269.269 *		54.0657 *
31-072-WR-1-COMP	128.034	66.891 *		21987.4	125.762	308.263 *	4016.33	214.089	248.346 *		55.159 *
31-072-WR-2	134.687	76.8276 *		11419	116.231		1562.2	225.707	205.382 *		39.1311 *
31-072-WR-2-COMP	126.977	84.7341 *		11197.5	105.347		1240.84	201.015	151.266 *		
31-072-WR-3	128.703	88.1159 *		16859.4	104.548		2144.99	231.971	243.806 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BELLE OF THE HILLS
PA NO. 31-072

AIMSS SCORESHEET

SITE NAME: BELLE OF THE HILLS
PA NUMBER: 31-072

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	49.088
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		43
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	45.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	89340

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	53.778
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	27
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	58080

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.793
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	2241

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.636
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	1.50

SITE NAME: BELLE OF THE HILLS
PA NUMBER: 31-072

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	200
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	300
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: DILLON MILLSITE **PA#:** 31-073

Date: July 22, 1993 **Time:** 1050-1200

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: Earl McCurley, MDSL
Steve Cutler, MDHES
Frank Maciosek, ASARCO

Weather/Seasonality Observations: Cloudy; cool; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: WR-2; #18: WR-1 and loadout; #19: Collapsed adit. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site by truck on Hall Gulch Road. Steve Cutler was present to ensure accessibility onto the site, and Frank Maciosek, from ASARCO, was present to oversee the investigation.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Move dumps away from dry creek (Hall Gulch) and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): DILLON MILLSITE PA#: 31-073

Legal Description: T 17N ;R 26W ;Sec. 12 , NW1/4 NW1/4 ___1/4

County: MINERAL Mining District: IRON MOUNTAIN

Latitude: N 47° 15' 15" Longitude: W 114° 51' 30"

Primary Drainage Basin and Code: Flat Creek/17010204
Secondary Drainage Basin: Hall Gulch

USGS Quadrangle map name(s): Plains

Mine Type/Commodities: Millsite/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Chris Pfahl, ASARCO, Inc., Box 440, Wallace, ID 83873. (208) 752-1116; Lolo National Forest.

Relationship to other mines/sites in the area/district: South of Hopkins mine (31-078) 1 mile; west of Belle of the Hills (31-072) 1/8 mile; north of Iron Mountain Millsite (31-010) 1 mile.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4440', Slope 35°, Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: WR-1 (275'x75')

Predominant vegetation types: Douglas fir, willow, cedar, grasses, shrubs (thick vegetation)

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Hall Gulch Road

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on Hall Gulch, dry fork off of Flat Creek.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes X, No___, # 1, Comment Collapsed
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: Only evidence found of mill is foundation for ball mill; possible crusher at one time, yet no tailings were found.

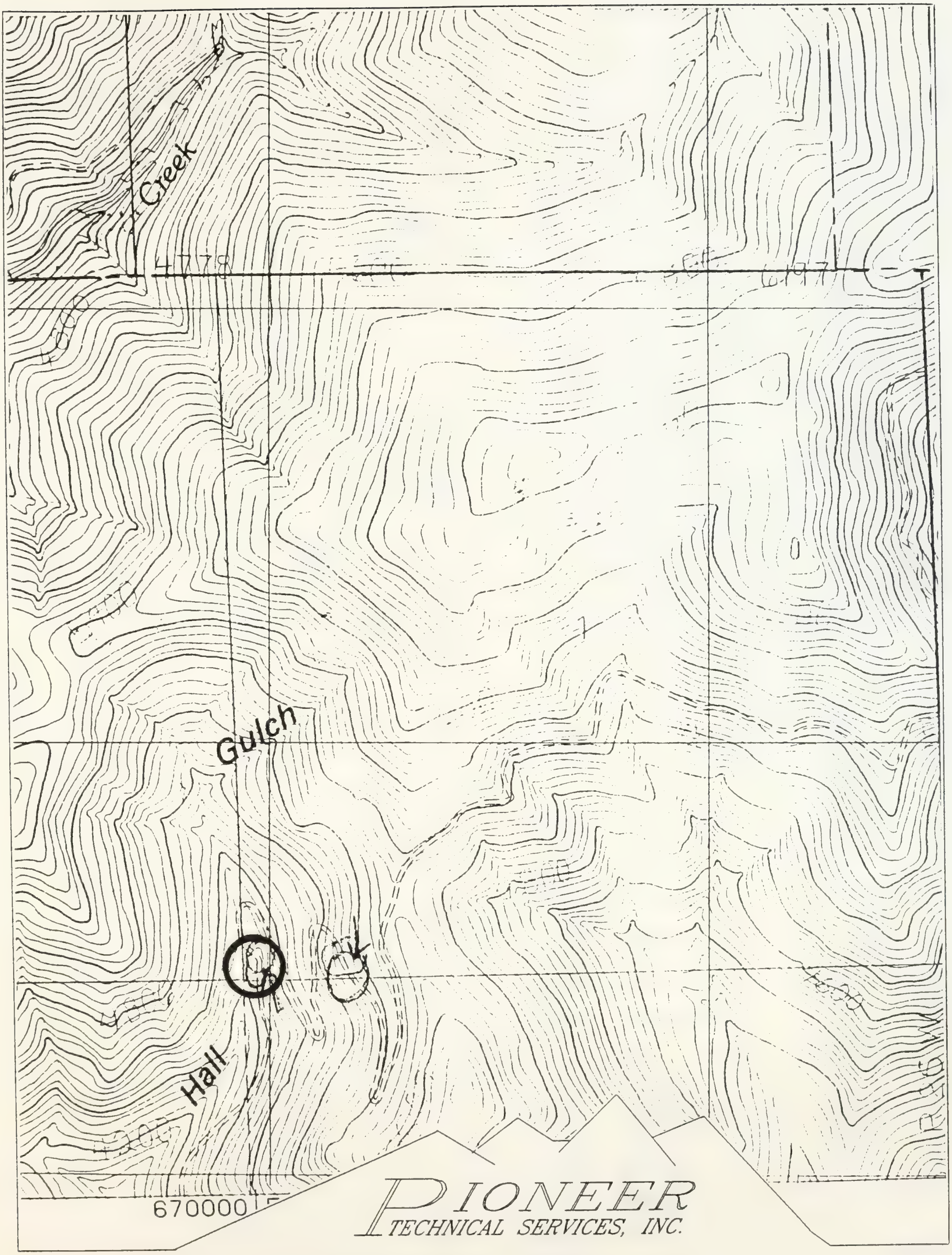
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Either went to Belle of the Hills and/or Iron Mountain Mill downstream.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Unknown

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

Well No.	Location	Depth	Yield	Static Water Level
M:73123	17N 26W 11 DBD	60.0	75.0	20.00
M:73124	17N 26W 13 CC	225.0	40.0	115.00

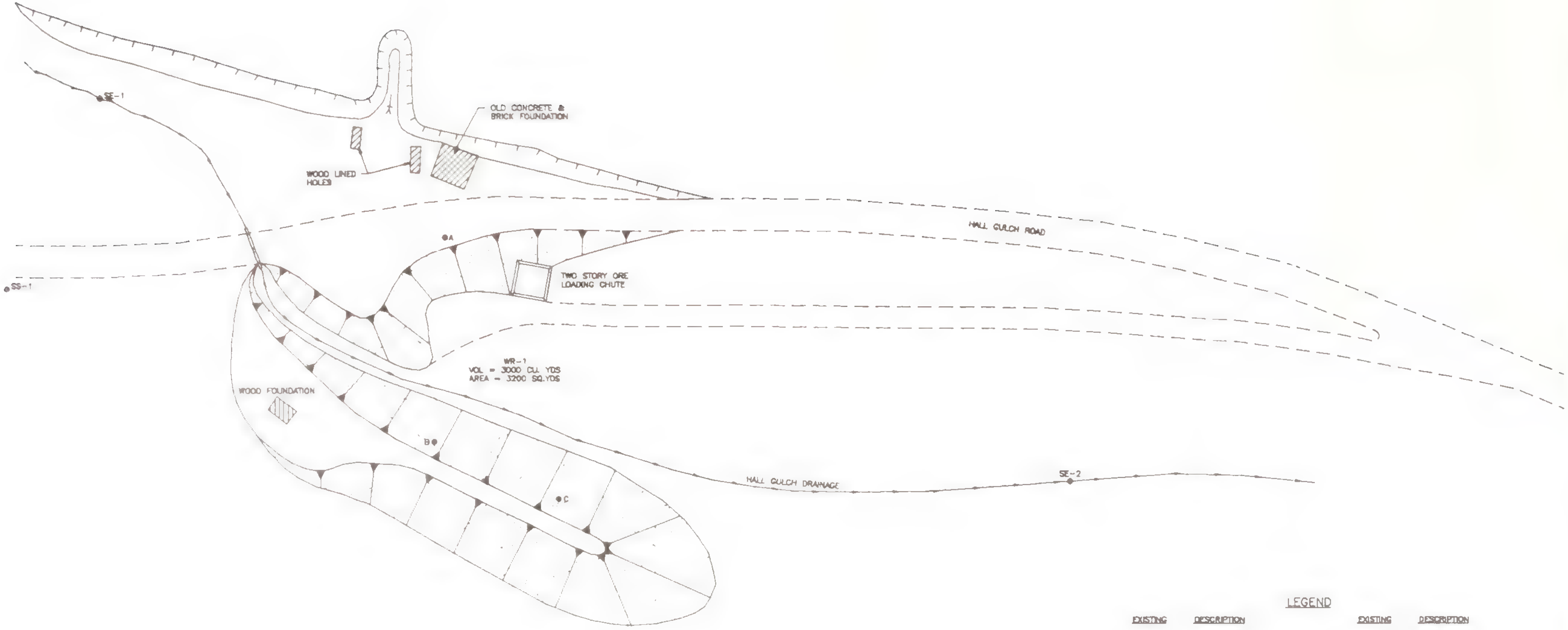


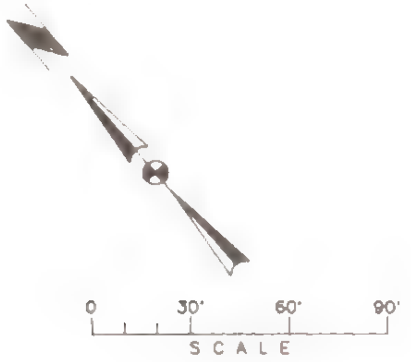
PIONEER
TECHNICAL SERVICES, INC.

DILLON MILLSITE, P.A. NO. 31-073

T17N, R26W, SECTION 12

SCALE: 1" = 1000'





LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═══	CULVERT	—<	OPEN ADIT
☼	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⊘	UTILITY POLE	☒	OPEN SHAFT
●	CENTERLINE MONUMENT	■	COLLAPSED SHAFT
●	DECIDUOUS TREE	⬭	EXCAVATION
✱	CONIFEROUS TREE	⬭	WASTE ROCK DUMP
—•—•—	WOOD FENCE	XXXX	COLLAPSED TIMBERS
—x—x—	WIRE FENCE	—+—+—	RAILS
▨	BUILDING	◕	LAB SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⌒	GATE	⊕W	WATER SAMPLE GROUND AND SURFACE
— · — ·	EDGE OF ASPHALT	◄——◄	DRAINAGE
— — —	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	◆— ı —◆	POWER LINE (OVERHEAD)
· · ·	VEGETATION	- - -	TAILINGS
WR	WASTE ROCK		
TP	TAILINGS PILE		

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

DILLON MILLSITE PA# 31-073
KEYSTONE DISTRICT MINERAL COUNTY

SHEET NO.

31-073.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,000	North of structure on small dump	None	5.8 (D)	0.04	31-073-WR-1	07/22/93 1700	T-Metals, ABA
WR-1B	WR		North end of WR-1 on south side of Hall Gulch	None	6.4 (D)	0.04			
WR-1C	WR		South end of WR-1 on south side of Hall Gulch	None	6.6 (D)	0.045			
SS-1	BKGRND	N/A	Background soil northwest of site along road	N/A	6.8 (D)	0.04	31-073-SS-1	07/22/93 1115	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-073-WR-1 is composite of WR-1A through -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_72___

Distance to nearest well used for drinking?_3 miles__________

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Limestone rocks; low metal values; no sulfides.

Other observations/notes:_N/A__________

GROUNDWATER INVENTORY FORM

SAMPLERS: ____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Hall Gulch

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-1 within Hall Gulch

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between WR-1 and Hall Gulch.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: Hall Gulch cuts through WR-1 during storms only.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Flat Creek has possible water supply 5 miles downstream and fishery. Clark Fork River has fishery, recreation, agriculture, irrigation, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes X , No_____, Distance downstream (ft)? 1300' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Waste rock in streambed for quite a distance down Hall Gulch, at least 1/4 mile.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Upstream in Hall Gulch	N/A	N/A	N/A	N/A	N/A	N/A	31-073-SE-1	07/22/93 1150	T-Metals
SE-2	SE	Downstream in Hall Gulch	N/A	N/A	N/A	N/A	N/A	N/A	31-073-SE-2	07/22/93 1130	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No water in Hall Gulch (sediment samples only).

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

$\text{pH} \le 5.0$ (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)?_ 1 acre____________________

Wetlands present: Yes_X_, No___, Describe:_ Small wetlands, approx. 1/2 acre, located above the site.__________

Carbonate rocks/soils: Yes_X_, No___, Describe:_ Wallace Formation___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Nearest residence(ft or miles)?_ 1.5 miles south____________________

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	Sulfides; FEOX	Dry	28,800	17,280	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X__, Describe:_______________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment_______________
Wilderness Area - Yes___, No_X_, Comment_______________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment_______________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:_______________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number 1 , types and locations: WR-1 is cut by Hall Gulch and has steep banks.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:_______________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Dillon Millsite, Prepared by Northern Engineering and Testing, July 10, 1988.

USGS, Topographic Map, Plains, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

DILLON MILLSITE
PA NO. 31-073

Dillon Millsite PA# 31-073
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-073-SE-1	41	190	0.7 U	6.1	2.9	17.2	24800	0.813	1040 J	8	395	9 U	275	NR
31-073-SE-2	396	38.3	6.5	8.4	1.5	22.4	22300	0.399	1480 J	19	498	45	3380	NR
31-073-WR-1	863	155	14	7.4	2.6	67.9	35300	1.43	4670 J	12	3970	813	7710	NR
BACKGROUND	13	257	0.5 U	8.5	2.7	15.5	17200	0.012 U	448 J	10	17	6 U	64	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-073-WR-1	0.48	15	131	116	0.07	0.21	0.2	6.56	124

LEGEND
SE1 – Upstream in Hall Gulch.
SE2 – Downstream in Hall Gulch.
WR1 – Composite of subsamples WR1A through 1C.
BACKGROUND – Northwest of site along road,
From Dillon Millsite (31-073-SS-1).

XRF ANALYSIS RESULTS

DILLON MILLSITE
PA NO. 31-073

Mine Name: Dillon Millsite PA# 31–073
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31–073–SS–1		12187.4	9410.79	2478.79		419.761 *	20379.8			100.444 *		200.86
31–073–WR1–A		33279.4	4674.07	1621.64		1223.03	23157.2		64.5923 *	4617.18	2769.48	36.0291
31–073–WR1–B		26346.5	62740.7	1597.54		3853.01	18420.8		207.033	4381.28	149.969 *	274.689
31–073–WR1–C		25389.6	18266	1306.12		8127.22	44848.4			3896.86	124.73 *	78.3216
31–073–WR–1–COMP		21711.7	29140.7	1264.58	178.958 *	4196.04	25866.2			4926.26	1468.46	165.57

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31–073–SS–1	237.511				87.3712		51.7711 *	643.617		14.9737 *	15.3599 *
31–073–WR1–A	183.086	43.7931 *		7416.48	132.39		1944.09	334.413	179.289 *		16.8085 *
31–073–WR1–B	153.208			295.878	130.127		155.333 *	1168.81		13.2558 *	12.354 *
31–073–WR1–C	174.171	41.3013 *		531.071	141.933		59.3426	903.544			7.06302 *
31–073–WR–1–COMP	168.985			2574.78	128.121		855.866	729.908	121.658 *		13.9894 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

DILLON MILLSITE
PA NO. 31-073

AIMSS SCORESHEET

SITE NAME: DILLON MILLSITE
PA NUMBER: 31-073

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	16.904
6		WELLS - 1 MI. x 2.5		5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		70
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	75.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	253560
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	18.179
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	28
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	356308
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		1
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.606
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	152
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		1
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	20
38		LIKELIHOOD SCORE	LINES 36 + 37C	70
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.564
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	79
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		6.10

SITE NAME: DILLON MILLSITE
PA NUMBER: 31-073

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

31-073, #17: WR-2

31-073, #18: WR-1 and loadout

31-073, #19: Collapsed adit

KEYSTONE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NANCY LEE MINES **PA#:** 31-001

Date: August 2, 1993 **Time:** 1103-1645

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; warm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #3: Adit (Flander Tunnel); #4: WR-1; #5: Overview and panorama; #6: Overview of WR-4, Adit, and buildings; #7: WR-2A associated with Adit; #8: WR-2A; #10: WR-2B; #11: WR-3; #12: Collapsed discharging adit; #13: SW-1 location and panorama; #14: Discharge over WR-4; #15: WR-4, east side; #16: WR-4, west side. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to the mine site was gained by truck, but have to walk into mine. Site includes: Nancy Lee Mine 31-001; Flander Tunnel 31-080; Fawcett Tunnel (?).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Stabilize dumps, contour, and revegetate; move dumps out of drainages.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NANCY LEE MINES PA#: 31-001

Legal Description: T 18N ;R 26W ;Sec. 31 , SW1/4 SE1/4 ___1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 16' 12" Longitude: W 114° 57' 12"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Keystone Creek

USGS Quadrangle map name(s): Keystone Peak

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Garth Crosby, Nancy Lee Mines, Inc., P.O. Box 968, Osburn, ID 83849; Lolo National Forest.

Relationship to other mines/sites in the area/district: Above the Nancy Lee Millsite (31-082) and to the southwest of Keystone Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4000', Slope 27°,
Aspect Eastern

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 4 acres.
Dimensions:

Predominant vegetation types: Lodgepole and Ponderosa pines, shrubs, grasses, knapweed

Access: roads - good X ,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites). Roads are good to site, but are now locked by a year-long National Forest Service gates.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by Precambrian rocks of the Ravalli Group. Unnamed tributary to Keystone Creek located about 1 mile from the site; 2.5 miles to Clark Fork River from Keystone Creek.

Mining/milling history, ore type/tenor, host rock, gangue: The mine has not been worked since 1977. Mineralization occurs as galena, sphalerite, tetrahedrite, chalcopyrite, arsenopyrite, and pyrite in veins in the Precambrian Ravalli Group. Gangue consisted of altered quartzite, quartz, and a little siderite. Mine was not accessible in 1953, but was being worked in 1967-1969. Production records show from 1911 through 1953 that 340 oz. of gold; 176,772 oz. of silver; 494,958 lbs. of copper; 2,474,715 lbs. of lead; 505,870 lbs. of zinc; and, 52,034 tons of ore were milled or smeltered.

Mine Operation?
Shafts - Yes___, No_X_, #____, Comment____
Adits - Yes_X_, No___, #_4_, Comment 2 open; one discharging
Pits - Yes___, No_X_, #____, Comment____
Placers - Yes___, No_X_, #____, Comment____
Other - Yes___, No_X_, #____, Comment____

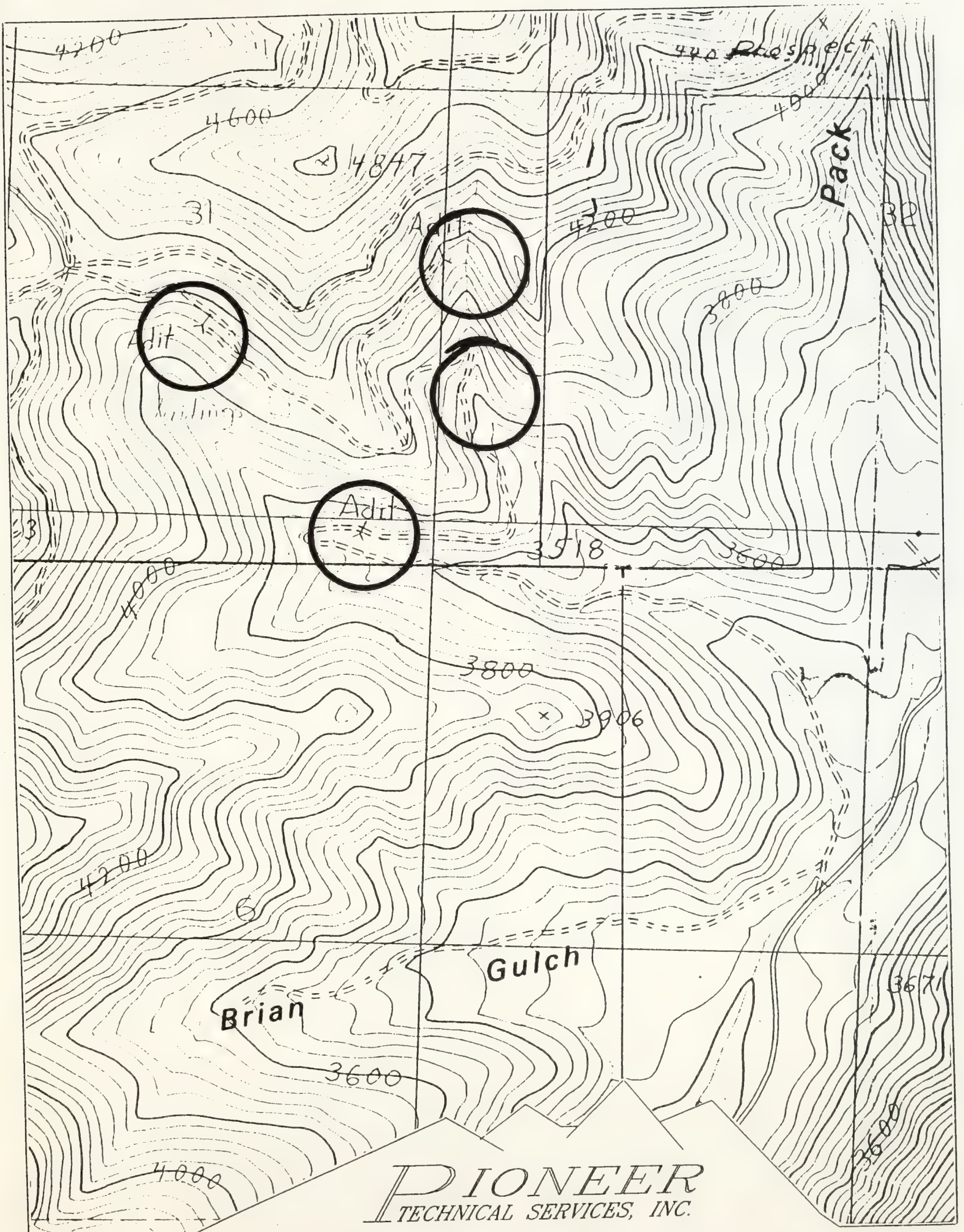
Mill Operation? Yes_X_, No___. If yes answer the next three questions:

Period(s) of Operation: 1945 to 1973 (Nancy Lee Millsite 31-082)

Origin of Ore Milled - Custom Mill___ Dedicated Mill_X_; Number and names of mines that supplied mill feed: Nancy Lee Mine supplied the feed.

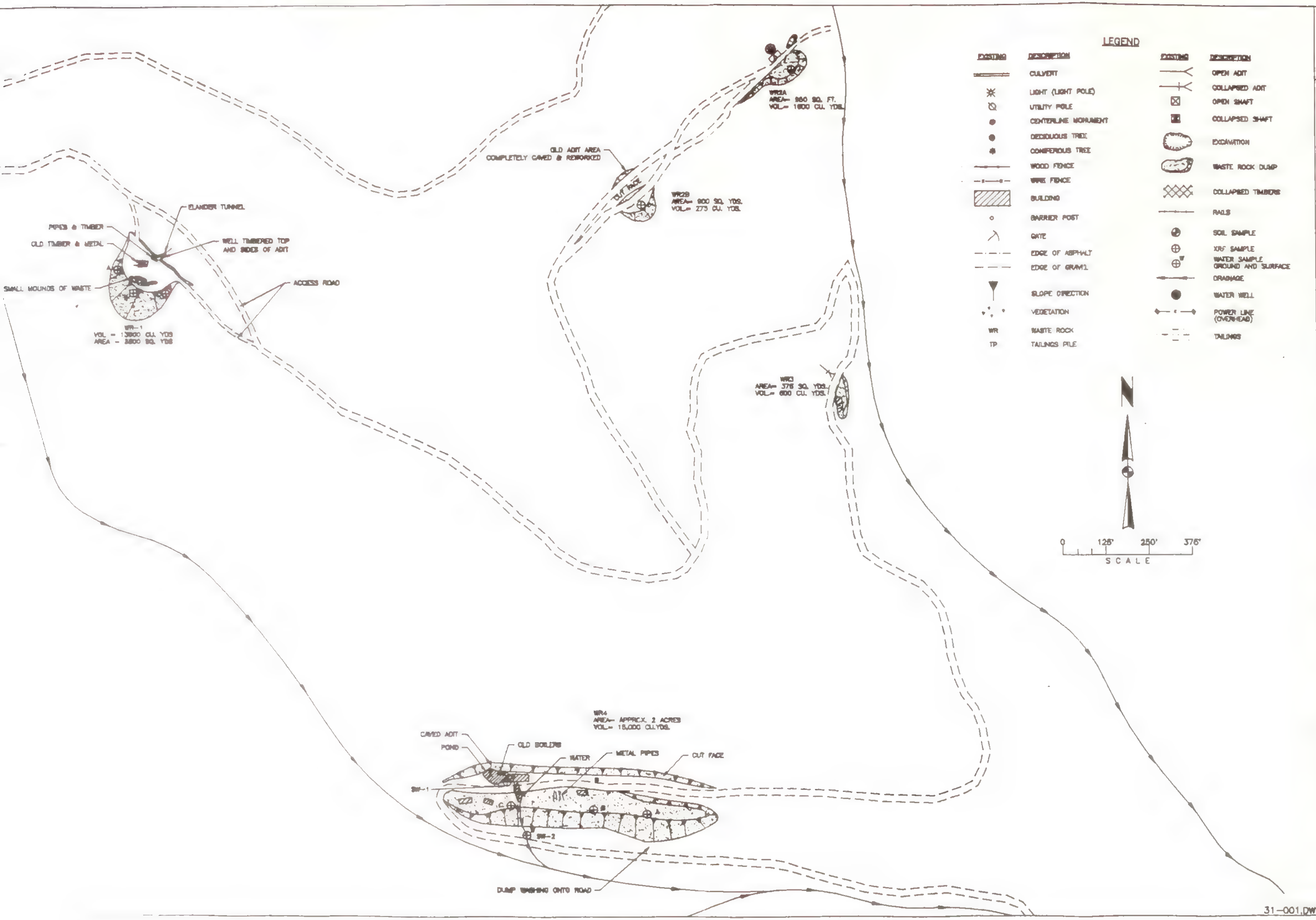
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? CN- vat and possibly floatation; reported as 40-50 tpd gravity floatation mill that produced copper, gold, and lead-concentrate, which was shipped to East Helena and Bunker Hill (not clear which mill).

Well No.	Location	Depth	Yield	Static Water Level
M:73636	18N 27W 25	12.0	1.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

NANCY LEE, P.A. NO. 31-001
T18N, R26W, SECTION 31
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
NANCY LEE PA# 31-001
KEY STONE DISTRICT MINERAL COUNTY

PIONEER

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

31-001.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	13,000	Waste rock assoc. with Flander Tunnel; west side	None	6.2 (D)	0.03	31-001-WR-1	08/02/93 2026	T-Metals, ABA
WR-1B	WR		Waste rock assoc. with Flander Tunnel; center	None	5.3 (D)	0.035			
WR-1C	WR		Waste rock assoc. with Flander Tunnel; east side	None	6.5 (D)	0.045			
WR-1D	WR		Waste rock assoc. with Flander Tunnel; possible ore pile	None	6.8 (D)	0.03	N/A	N/A	XRF Analysis
WR-2A	WR	1,800	Waste rock assoc. with Fawcett Tunnel; east side	None	6.5 (D)	0.04	31-001-WR-2	08/02/93 2040	T-Metals, ABA
WR-2B	WR	275	Waste rock assoc. with Fawcett Tunnel; west side	None	6.4 (D)	0.04			
WR-3	WR	800	Adit in drainage below Fawcett Tunnel	None	6.6 (D)	0.035			
WR-4A	WR	15,000	Waste rock at Nancy Lee Mine; east side	None	5.8 (D)	0.045	31-001-WR-3	08/02/93 2045	T-Metals, ABA
WR-4B	WR		Waste rock at Nancy Lee Mine; center	None	6.4 (D)	0.04			
WR-4C	WR		Waste rock at Nancy Lee Mine; west side	None	6.2 (D)	0.04			
SS-1	BKGRND	N/A	Background soil west of WR-1 on divide near road	N/A	N/A	N/A	31-001-SS-1	08/02/93 1210	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-001-WR-1 is a composite of WR-1A through -1C. 31-001-WR-2 is a composite of WR-2A and -2B, and WR-3. 31-001-WR-3 is a composite of WR-4A, through -4C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No____, Number: 1 Identification: Adit associated with WR-4

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 53

Distance to nearest well used for drinking? Approx. 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Discharge from adit and water reenters ground after flowing over wast rock.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No___, Name(s): Water discharging from adit into unnamed drainage

Dry streambeds: Yes X, No___, Name(s): Unnamed (Mill Gulch?)

Other surface water: Yes____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:___________, Average Flow:_____________

Distance between waste source(s) and nearest surface water body (ft)?
30 feet from WR-4 to unnamed stream and from WR-3 to other drainage.

Surface water draining onto or through waste sources: Yes X, No____,
Describe: Discharge from adit goes over WR-4 and over tailings from Nancy Lee Mill (31-082).

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Mill Gulch has none; Keystone Creek has none; Clark Fork River has fishery, irrigation, and recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings in streambed downstream are part of Nancy Lee Millsite.

SURFACE WATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	AD	Discharge from adit above WR-4, sampled approx. 50 feet from collapsed adit mouth	6.75	281	36	25.2	390	2 gpm (E)	31-001-SW-1	08/02/93 1600	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-2	SW	Discharge from adit which flows through WR-4, taken below dump	8.27	155	31	26.6	341	1 gpm (E)	31-001-SW-2	08/02/93 1630	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 3 acres

Wetlands present: Yes X , No ___, Describe: Approx. 1 acre of wetland present.

Carbonate rocks/soils: Yes X , No _____, Describe: Waste rock is carbonate rocks. Wall rock in mine reported to contain secondary carbonate minerals.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3; FEOX	Dry	32,400	32,400	No	Low
WR-2	SO3; FEOX	Dry	16,650	16,650	No	Low
WR-3	SO3; FEOX	Dry	3,375	3,375	No	Low
WR-4	SO3; FEOX	Dry	87,000	87,000	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:____________________

Accessibility - Fences, warning signs, closed roads? Bad roads; closed due to a year-long Forest Service gate.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations: Flander Tunnel (WR-1) and Fawcett Tunnel (WR-2) are both open, but fenced.

Hazardous structures: Yes___, No_X_, Number____, types and locations:____________________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Nancy Lee, Mineral County, Form 39, 1972-1981.

MBMG, State Technical Services Mine Visit Report, Prepared by Don C. Lawson, February 28, 1969.

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MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for the Nancy Lee Mine, Prepared by Dick Juntunen, August 22, 1984.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Flander Tunnel (Nancy Lee Mine), Prepared by Northern Engineering and Testing, July 6, 1988, June 29, 1988, and June 28, 1988.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory for the Nancy Lee Mine, Prepared by Daphne Digrindakis, September 16, 1985.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-L, Author Unknown, Date Unknown, pp. 590-593.

USGS, Topographic Map, Keystone Peak, Montana, 7 1/2 minute Quadrangle, 1985.

Zartman, R.E., Stacey, J.S., Table 1--Location, Geologic Relationships, and Lead Isotopic Composition of Some Galena Deposits in Northwestern Montana, Date Unknown, p. 852.

LABORATORY ANALYTICAL DATA

NANCY LEE MINE
PA NO. 31-001

Nancy Lee Mine PA# 31-001
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-001-WR-1	445	4.95	0.5 U	2.55	1.41 U	60.3 J	27100	0.008 UJ	920	2.62 U	340 J	46.2	22.5	NR
31-001-WR-2	143	12	0.4 U	4.34	2.27	55.4 J	19800	0.014 J	2050	2.11 U	266 J	7.7	324	NR
31-001-WR-3	143	62.8	0.5 U	8.73	2.01	161 J	30000	0.058 J	2290	9.12	279 J	27.1	184	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.009 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-001-WR-1	0.28	8.75	0.90	-7.84	0.21	0.02	0.05	0.62	0.28
31-001-WR-2	0.55	1.56	4.97	3.41	0.01	0.01	0.03	0.31	4.66
31-001-WR-3									
31-001-WR-1DUF	0.29	9.06	1.15	-7.90	0.23	0.02	0.040	0.62	0.53

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31-001-SW-1	815	40.5	2.57 U	9.7 U	8.2	1.55 U	33900	0.038 U	8160	15.3	1.55 U	30.7 U	7.57 U	530
31-001-SW-2	274	28	2.57 U	9.7 U	14.6	1.55 U	13200	0.038 U	7300	27	1.55 U	30.7 U	7.57 U	540

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
31-001-SW-1	694	16.0	213	< 0.05	NR
31-001-SW-2	684	5.7	214	< 0.05	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A, 2B, and 3.
WR3 - Composite of subsamples WR4A, 4B, and 4C.
BACKGROUND - West of waste rock dump 1 on divide near road.

SW1 - Discharge from adit above waste rock dump 4.
SW2 - Discharge from adit which flows through waste rock dump 4, taken below dump.

XRF ANALYSIS RESULTS

NANCY LEE MINE
PA NO. 31-001

Mine Name: Nancy Lee PA# 31-001
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-001-WR1-A		22116.4	1641.62	1091.27	193.49 *		29288.3				729.633	25.4653
31-001-WR1-B		14531.6	1028.27	894.344	183.411 *		16392.7				519.796	23.3405
31-001-WR1-C			1623.71	1237.32		1800.72	19411				33.6093 *	16.8112 *
31-001-WR1-D			2195.13	345.377 *	154.094 *	19774.9	289144		638.358	183.037 *	4723.11	14.372 *
31-001-WR2-A			1402.42	1506.84		1660.18	20405			68.4921 *	56.3188 *	21.9446
31-001-WR2-B			3266.66	1959.21		1990.29	28587.8		84.0495 *	396.056	403.272	38.0599
31-001-WR4-A			3604.4	2049.08		1362.35	35169.4			110.292 *		44.4475
31-001-WR4-B			9274.76	1430.82	160.627 *	3020.09	14049.8			66.5604 *	316.257	31.3905
31-001-WR4-C			6386.96	1441.23		3396.21	36667.4		81.0509 *	326.066	214.514	36.3098
31-001-WR-1-COMP			1157.12	878.729	170.109 *	428.578 *	21125.5			47.8371 *	425.558	19.6816
31-001-WR-2-COMP			1778.75	1115.1	198.826 *	2461.29	17984.4			361.881	115.032 *	23.1228
31-001-WR-3			1640.17	896.58	150.556 *	3300.91	12940.2			414.747	41.7773 *	20.7599
31-001-WR-3-COMP			6191.9	1550.4	220.254 *	2886.89	31046.1			198.799	170.802	38.1444

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-001-WR1-A	285.851			346.05	89.526		144.343 *	106.413	85.897 *		11.0271 *
31-001-WR1-B	285.975			189.972	79.0301		76.9829 *	102.524	77.9519 *		11.2012 *
31-001-WR1-C	447.861				98.1536			115.435			14.7053 *
31-001-WR1-D	82.575			2191.86		366.491 *	104.554 *	35.8748 *	291.836 *		
31-001-WR2-A	408.213			40.0668 *	115.2			244.663			15.5578 *
31-001-WR2-B	321.518			990.314	103.728		42.115 *	565.516	105.272 *		20.1123 *
31-001-WR4-A	277.789			121.987	191.051			812.555	76.7094 *		15.2693 *
31-001-WR4-B	340.376				118.117			489.852	122.751 *		13.853 *
31-001-WR4-C	306.336			399.408	92.0418			780.397	102.88 *		12.2644 *
31-001-WR-1-COMP	270.561			173	77.7743		53.934 *	92.1145			13.1032 *
31-001-WR-2-COMP	354.346			269.763	105.104			328.563	99.7644 *		11.1889 *
31-001-WR-3	402.099			26.0835 *	94.2012			292.589	95.4538 *		15.1087 *
31-001-WR-3-COMP	314.683			161.158	130.047			612.71	77.4254 *		12.2137 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NANCY LEE MINE
PA NO. 31-001

AIMSS SCORESHEET

SITE NAME: NANCY LEE MINE
PA NUMBER: 31-001

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.770
6		WELLS - 1 MI. x 2.5		2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		52
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	54.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	150093

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	300
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	14.956
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	53842

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.180
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	225

DIRECT CONTACT PATHWAY

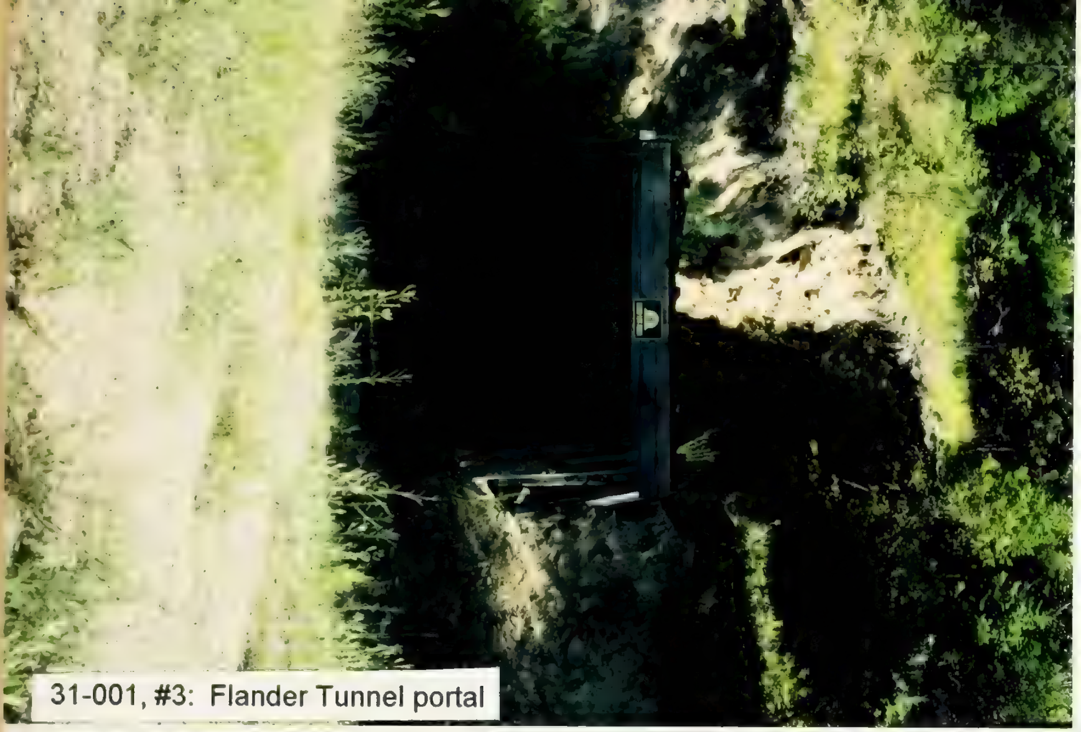
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.164
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	4

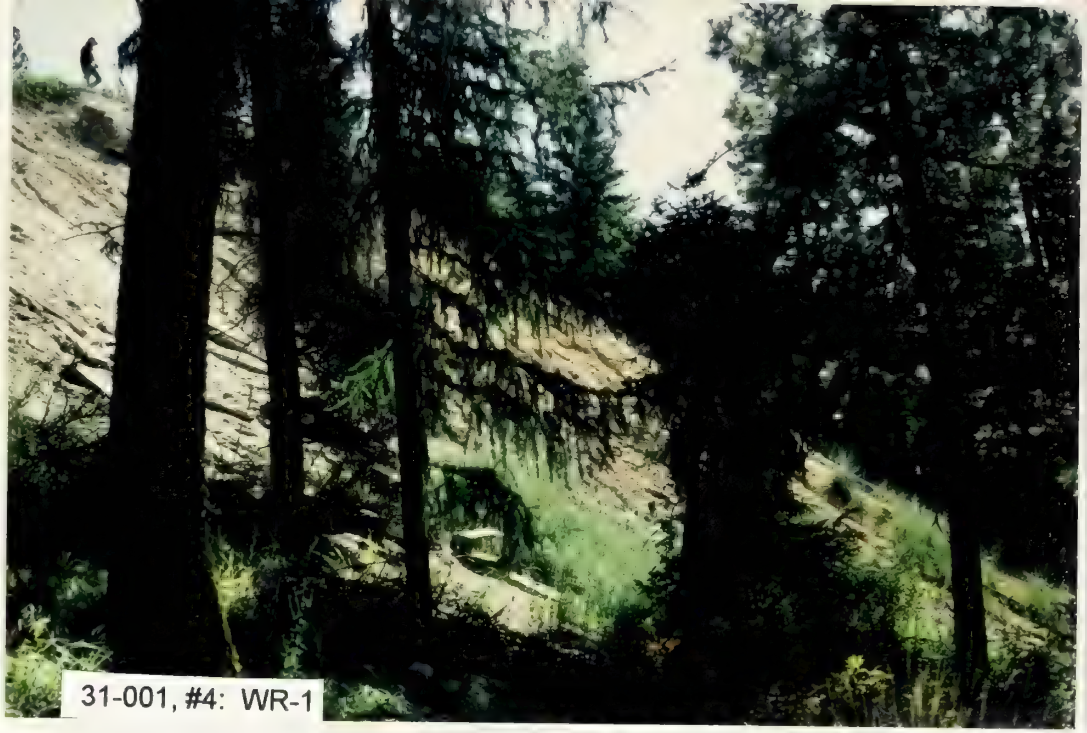
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**2.04**

SITE NAME: NANCY LEE MINE
PA NUMBER: 31-001

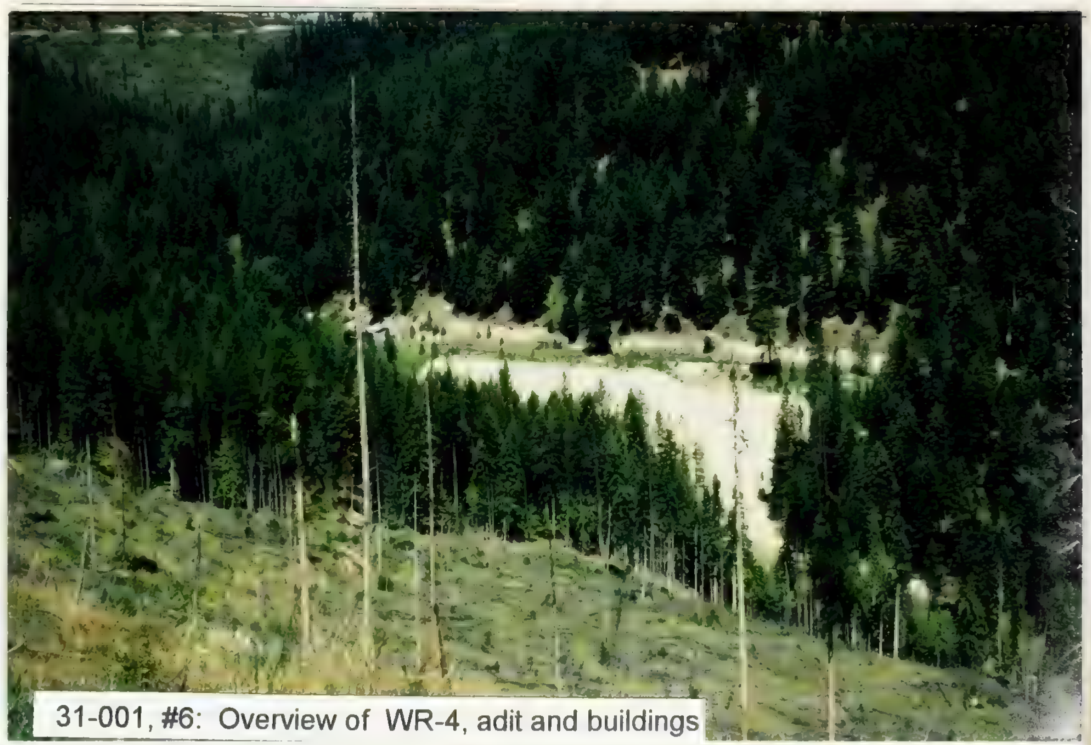
SITE SAFETY

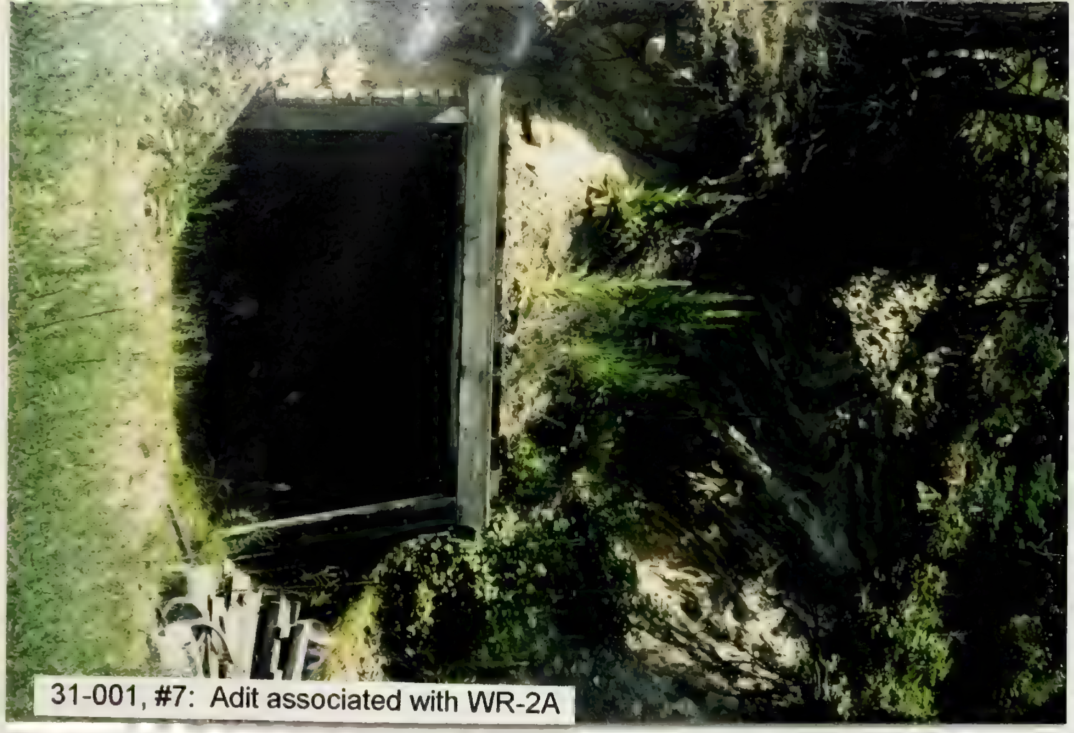
LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.50**

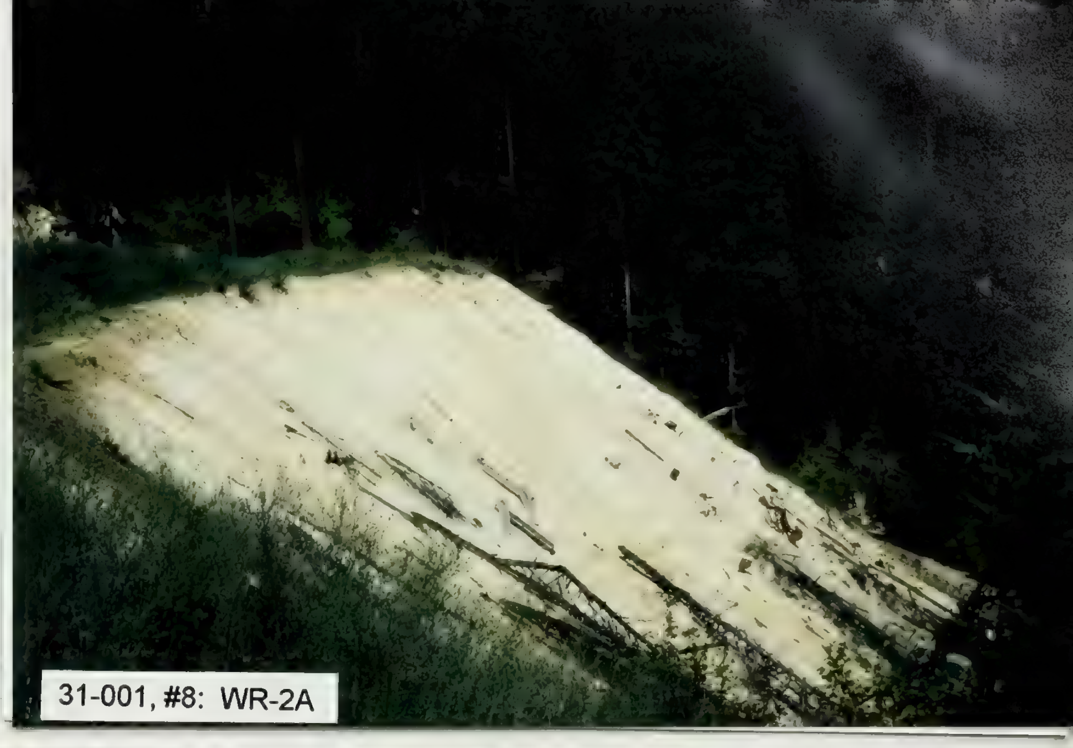

31-001, #3: Flander Tunnel portal


31-001, #4: WR-1

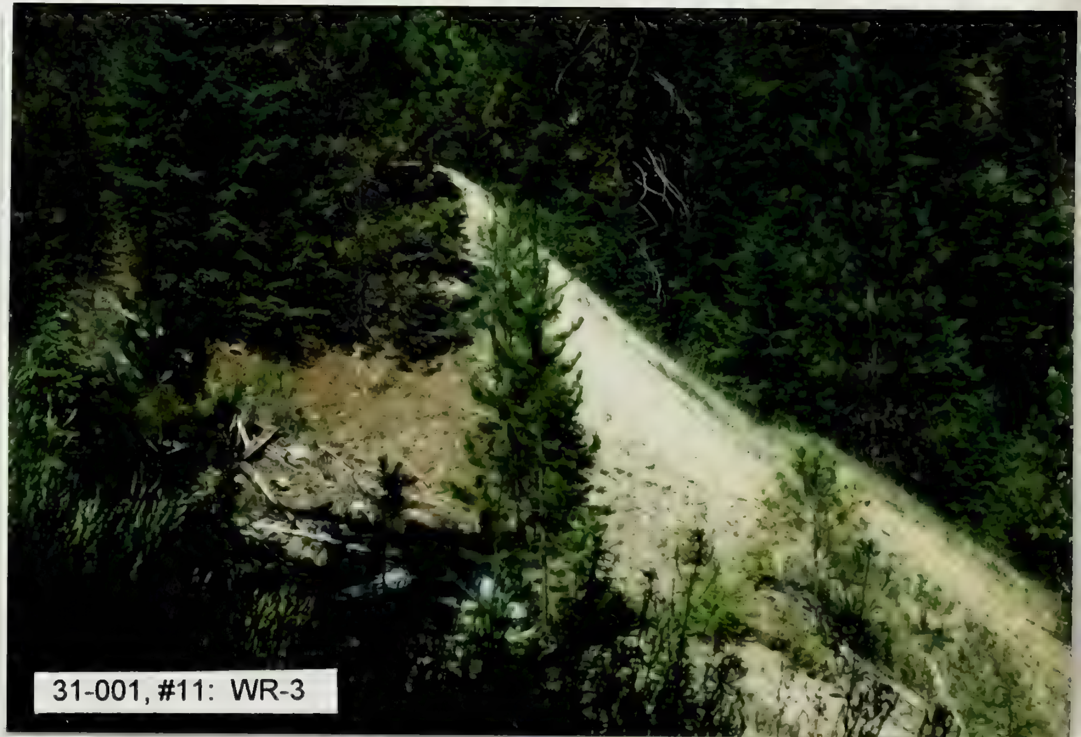
31-001, #5: Overview of site


31-001, #6: Overview of WR-4, adit and buildings

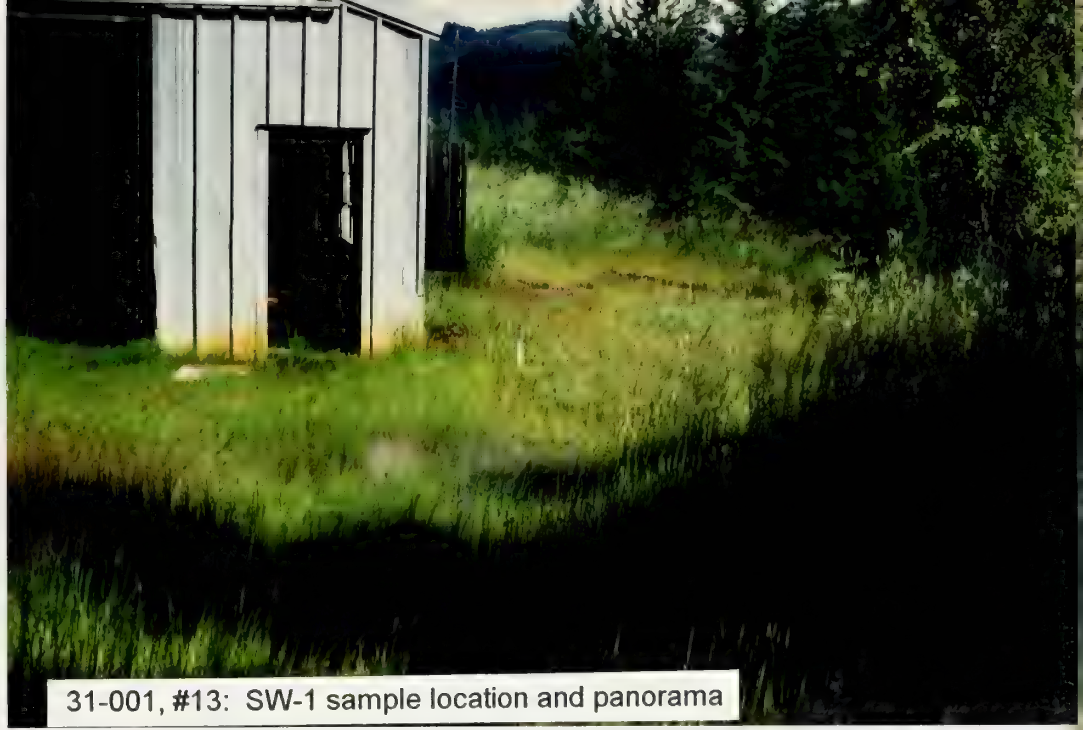

31-001, #7: Adit associated with WR-2A


31-001, #8: WR-2A

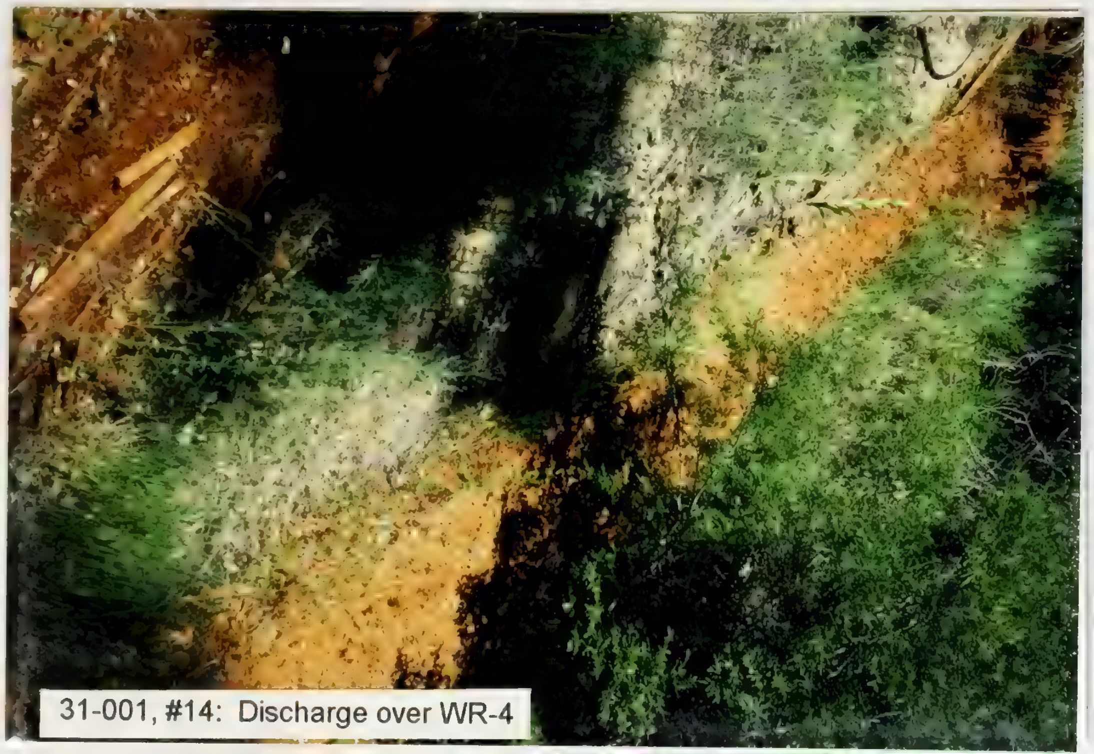
31-001, #10: WR-2B


31-001, #11: WR-3

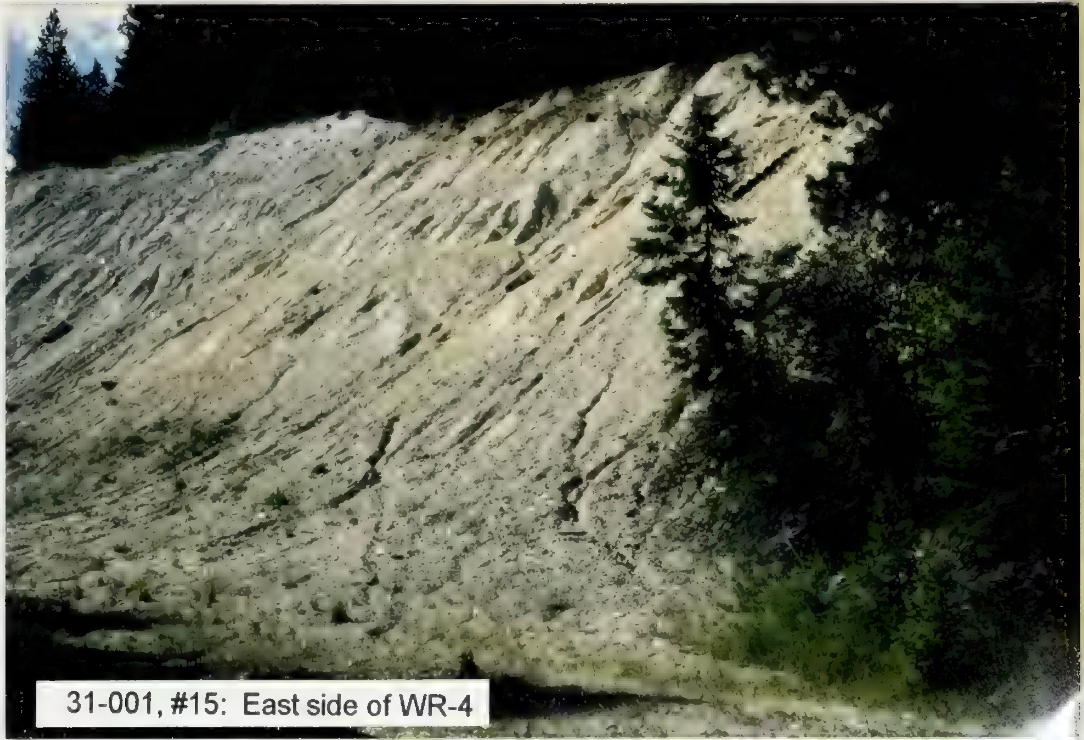
31-001, #12: Collapsed discharging adit



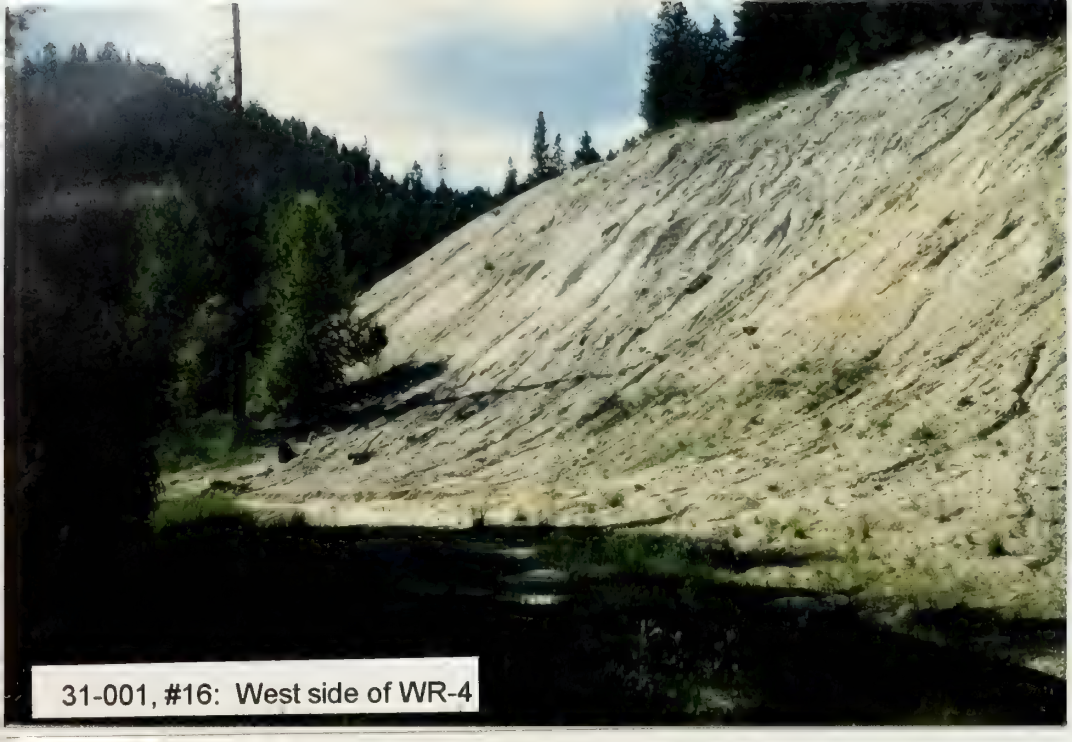
31-001, #13: SW-1 sample location and panorama



31-001, #14: Discharge over WR-4



31-001, #15: East side of WR-4


31-001, #16: West side of WR-4

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: KEYSTONE **PA#:** 31-074

Date: August 2, 1993 **Time:** 0830-1000

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; warm; clear; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #1: Adit and GW-1 location; #2: Vegetated dump WR-1. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Access to site was by truck.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close adit and revegetate dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): KEYSTONE PA#: 31-074

Legal Description: T 18N ;R 26W ;Sec. 32 , NE1/4 SE1/4 ___1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 16' 22" Longitude: W 114° 55' 40"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Keystone Creek

USGS Quadrangle map name(s): Keystone Peak

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: Approx. one mile east of the Nancy Lee Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3700' , Slope 27° ,
Aspect Southeast

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.6 acres.
Dimensions:

Predominant vegetation types: Ponderosa pine, spruce, shrubs, knapweed

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in a dry drainage adjacent to Keystone Creek. Water running off the site would flow south into Keystone Creek and then southwest away from the site. Site lies on the Burke and Revett Formations, quartzite and phyllite, all dolomitic.

Mining/milling history, ore type/tenor, host rock, gangue: History is unavailable. Tetrahedrite and galena are present.

Mine Operation?

Shafts -	Yes___,	No X ,	# _____,	Comment
Adits -	Yes X ,	No___,	# 1 ,	Comment Open with discharge and locked gate
Pits -	Yes___,	No X ,	# _____,	Comment
Placers -	Yes___,	No X ,	# _____,	Comment
Other -	Yes___,	No X ,	# _____,	Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

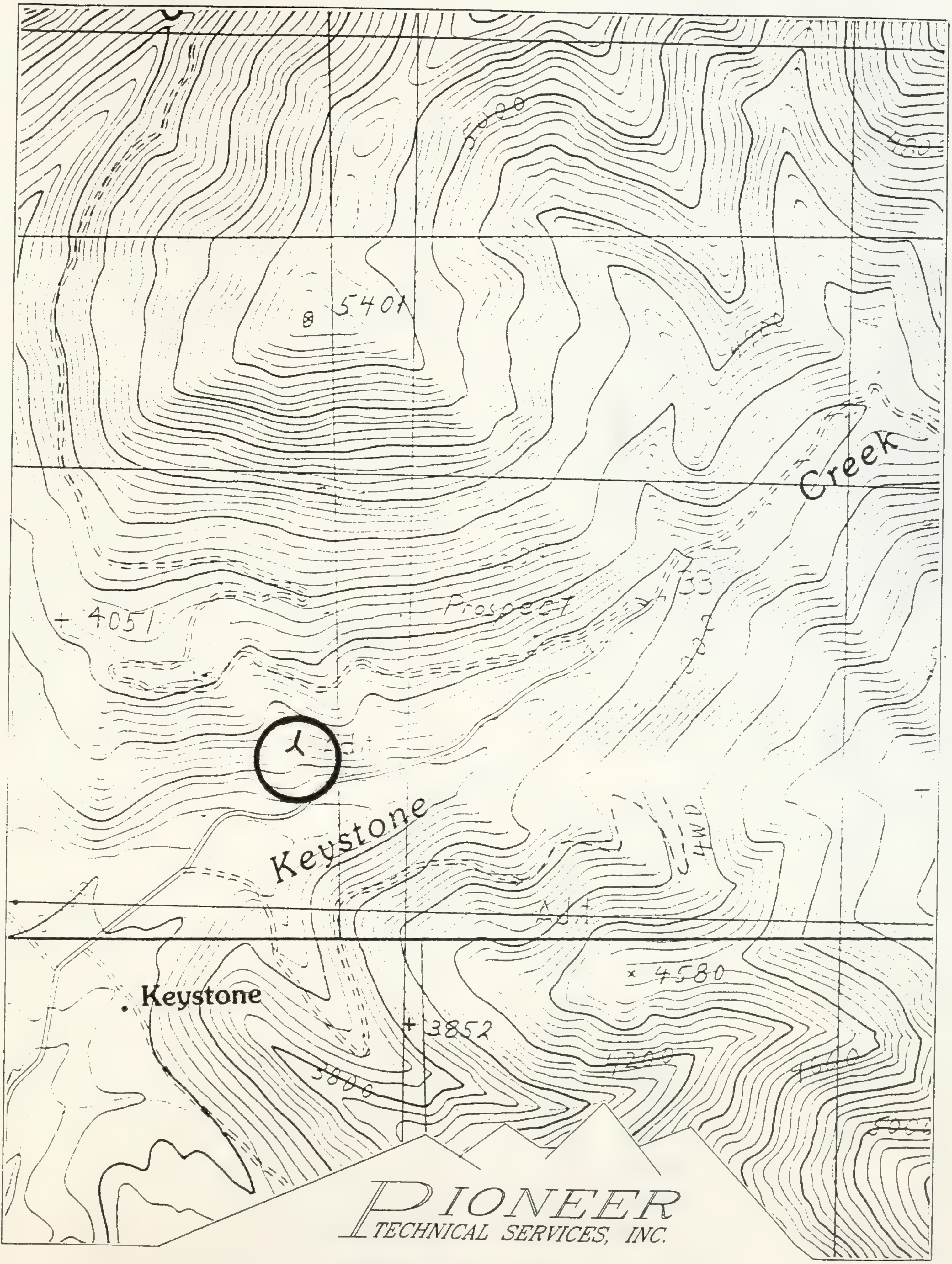
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/10/1993

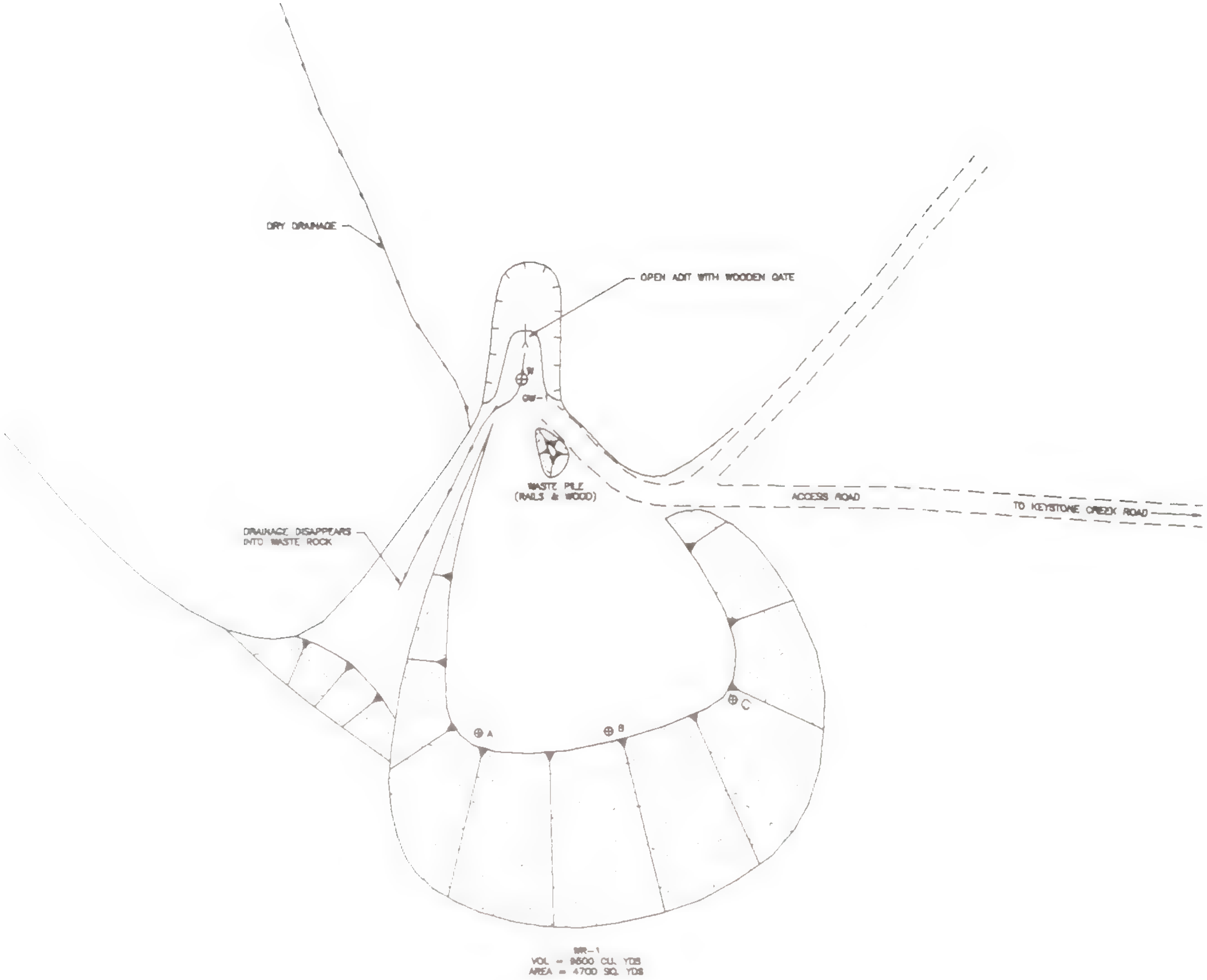
Well No.	Location	Depth	Yield	Static Water Level
M:73122	17N 26W 04 DAD	95.0	25.0	12.00

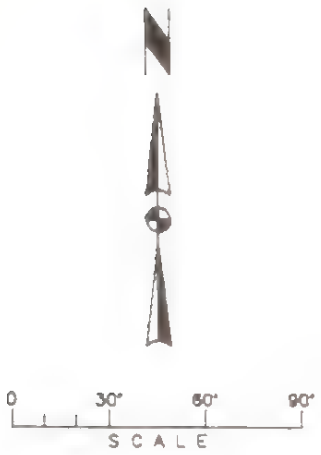


PIONEER
TECHNICAL SERVICES, INC.

KEYSTONE, P.A. NO. 31-074

T18N, R26W, SECTION 32
SCALE: 1" = 1000'





LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═	CULVERT	—<	OPEN ADIT
✳	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⊘	UTILITY POLE	⊠	OPEN SHAFT
●	CENTERLINE MONUMENT	▣	COLLAPSED SHAFT
●	DECIDUOUS TREE		EXCAVATION
●	CONIFEROUS TREE		WASTE ROCK DUMP
—•—	WOOD FENCE	XXXX	COLLAPSED TIMBERS
—x—x—	WIRE FENCE	—	RAILS
▨	BUILDING	◕	SOIL SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⋀	GATE	⊕	WATER SAMPLE GROUND AND SURFACE
-·-·-	EDGE OF ASPHALT	—◆—	DRAINAGE
- - -	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	◆—•—◆	POWER LINE (OVERHEAD)
∴	VEGETATION	- - -	TAILINGS
WR	WASTE ROCK		
TP	TAILINGS PILE		

31-074.DWG

SHEETS

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

KEYSTONE PA# 31-074
KEYSTONE DISTRICT MINERAL COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	9,500	Southwest side of dump	None	6.7 (D)	0.05	31-074-WR-1	08/02/93 0940	T-Metals, ABA
WR-1B	WR		South end of dump	None	6.8 (D)	0.045			
WR-1C	WR		Southeast side of dump	None	6.3 (D)	0.045			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-074-WR-1 is composite of WR-1A through -1C. Subsamples -1B and -1C are from an older appearing dump which is vegetated with no FEOX or sulfides present. Subsample -1A is from a recent stockpile of ore; it is unvegetated with no sulfides or FEOX present.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Only adit present had discharge.

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes___, No X , Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 45

Distance to nearest well used for drinking? 1/2 mile in Keystone

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Possible due to discharge from adit then it goes back into the ground, however, it is quite unlikely due to the carbonate rocks.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	GW	Discharge from adit	< 1 gpm (E)	7.89	265	670	10.5	194	N/A	31-074-GW-1	08/02/93 0845	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Keystone Creek (dry below the site, but flowing one mile downstream.)

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? Approx. 60 feet

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Adit discharge runs over then adjacent to dump.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Keystone Creek has wetlands; Clark Fork River has wetland, irrigation, agriculture, recreation, and fishery.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1/10 of an acre

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No_____, Describe: Waste rock is carbonate rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/2 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Dry	42,300	21,150	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________________________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________________________________

Evidence of recreational use on site: Yes_X_, No___, Describe: During this investigation, the site looked as if it had been recently mowed.

Accessibility - Fences, warning signs, closed roads? Unrestricted; adit is fenced and locked, but has a wooden gate.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit, although gated and locked, is hazardous due to the flimsy wood gate.

Hazardous structures: Yes___, No_X_, Number____, types and locations:________________________________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________________________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________________________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Keystone site, Prepared by Northern Engineering and Testing, July 7, 1988.

USGS, Topographic Map, Keystone Peak, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

KEYSTONE
PA NO. 31-074

Keystone PA# 31-074
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-074-WR-1	4.75 U	53.2	0.5 U	2.9	1.38 U	84.9 J	7490	0.01 UJ	1180	2.55 U	39.5 J	6.19 U	37.5	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.01 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31-074-GW-1	1.69 U	51.5	2.57 U	9.7 U	6.83 U	1.55 U	1010	0.15 J	813	13	1.55 U	30.7 U	7.57 U	314

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
31-074-GW-1	375	< 5.0	107	< 0.05	NR

LEGEND

WR1 - Composite of subsamples WR1A through 1C.
BACKGROUND - From Nancy Lee Mine (31-001-SS-1).
GW1 - Discharge from adit.

XRF ANALYSIS RESULTS

KEYSTONE
PA NO. 31-074

Mine Name: Keystone PA# 31-074
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-074-WR1-A		44428	9066.46	2127.13		1757.38	17331.1			84.897 *	64.3806 *	38.768
31-074-WR1-B		51988.7	14280.2	3183.18	171.403 *	1238.49 *	20039.8		83.0327 *	95.2625 *	77.223 *	34.5599
31-074-WR1-C			15311.3	2912.7		1122.85 *	17600.9			96.5067 *	65.515 *	82.1823
31-074-WR-1-COMP			11890.5	2279.4	202.288 *	1602.77	17477.2			102.026 *		54.9192

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-074-WR1-A	264.295				199.694			758.797		13.0891 *	11.2778 *
31-074-WR1-B	294.8				219.57			1806.9		20.0588 *	16.7375 *
31-074-WR1-C	320.712			52.0067 *	185.691			2284.93	76.9599 *		15.6015 *
31-074-WR-1-COMP	379.548			43.7639 *	188.559			1460.34			14.9016 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

KEYSTONE
PA NO. 31-074

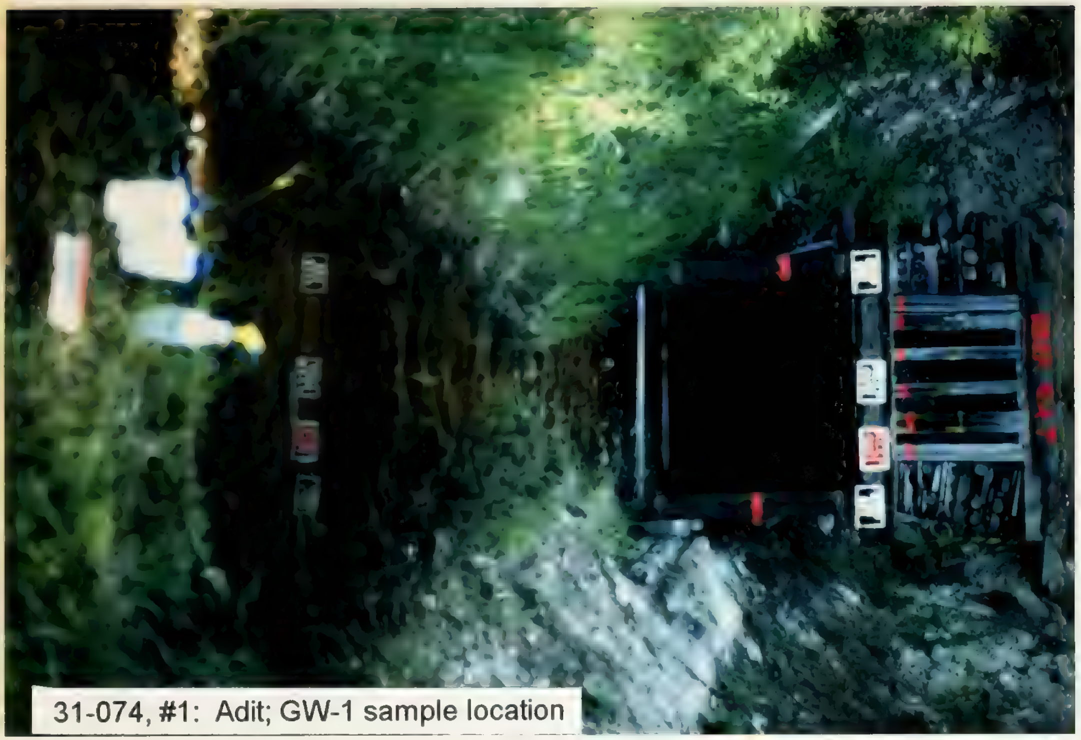
AIMSS SCORESHEET

SITE NAME: KEYSTONE
PA NUMBER: 31-074

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.117
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		44
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	46.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1088
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.143
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	629
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.004
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	5
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.02**

SITE NAME: KEYSTONE
PA NUMBER: 31-074

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**6.00**


31-074, #1: Adit; GW-1 sample location

31-074, #2: WR-1 (vegetated dump)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LITTLE ANACONDA **PA#:** 31-077

Date: July 23, 1993 **Time:** 0900

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Cloudy; cool.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #29: Upper adit; #30: WR-2, upper (associated with upper adit); #31,#32: WR- 1, lower; #33: Lower adit with discharge. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site was by truck. Recent exploration activity has taken place at the site. Dumps have high pH, as does water.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Lessen slopes of dumps in drainage; route surface water through to stop sedimentation problem.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LITTLE ANACONDA PA#: 31-077

Legal Description: T 18N ;R 26W ;Sec. 35 , SE1/4NW 1/4 ___1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 16' 40" Longitude: W 114° 52' 35"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Pardee Creek

USGS Quadrangle map name(s): Plains

Mine Type/Commodities: Hardrock/Silver, Zinc, Lead, Copper

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): David Maclay, 828 Ronald Avenue, Missoula, MT 59801. (406) 549-7645; Lolo National Forest.

Relationship to other mines/sites in the area/district: Keystone group of mines, 3 miles west; Iron Mountain group, 2 miles southeast; Hopkins mine, 1/2 mile southeast, in the same drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5400'-5600', Slope 40° ,
Aspect Southeast

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 1 acres.
Dimensions: Approx. 300 feet x 150 feet

Predominant vegetation types: Cedar, willow, Douglas fir, bear grass, knapweed

Access: roads - good X ,poor___,4wd___,trail___.
Other logical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Unnamed dry tributary to Pardee Creek drains to Pardee Creek 1/2 mile away. Pardee Creek has confluence with the Clark Fork River 6 miles past the site.

Mining/milling history, ore type/tenor, host rock, gangue: Only recorded production in 1942 and 1952. Ore minerals are pyrite, galena, sphalerite, chalcopyrite; silver, lead, zinc sulfides in Wallace Formation. Gangue is quartz barite, siderite, and quartz. Host rock in Wallace Formation is composed of limestone, dolomites, argillites, and phyllites.

Mine Operation?

Shafts - Yes___, No_X_, #____, Comment

Adits - Yes_X_, No___, #_2_, Comment 1 discharge; both open and gated

Pits - Yes___, No_X_, #____, Comment

Placers - Yes___, No_X_, #____, Comment

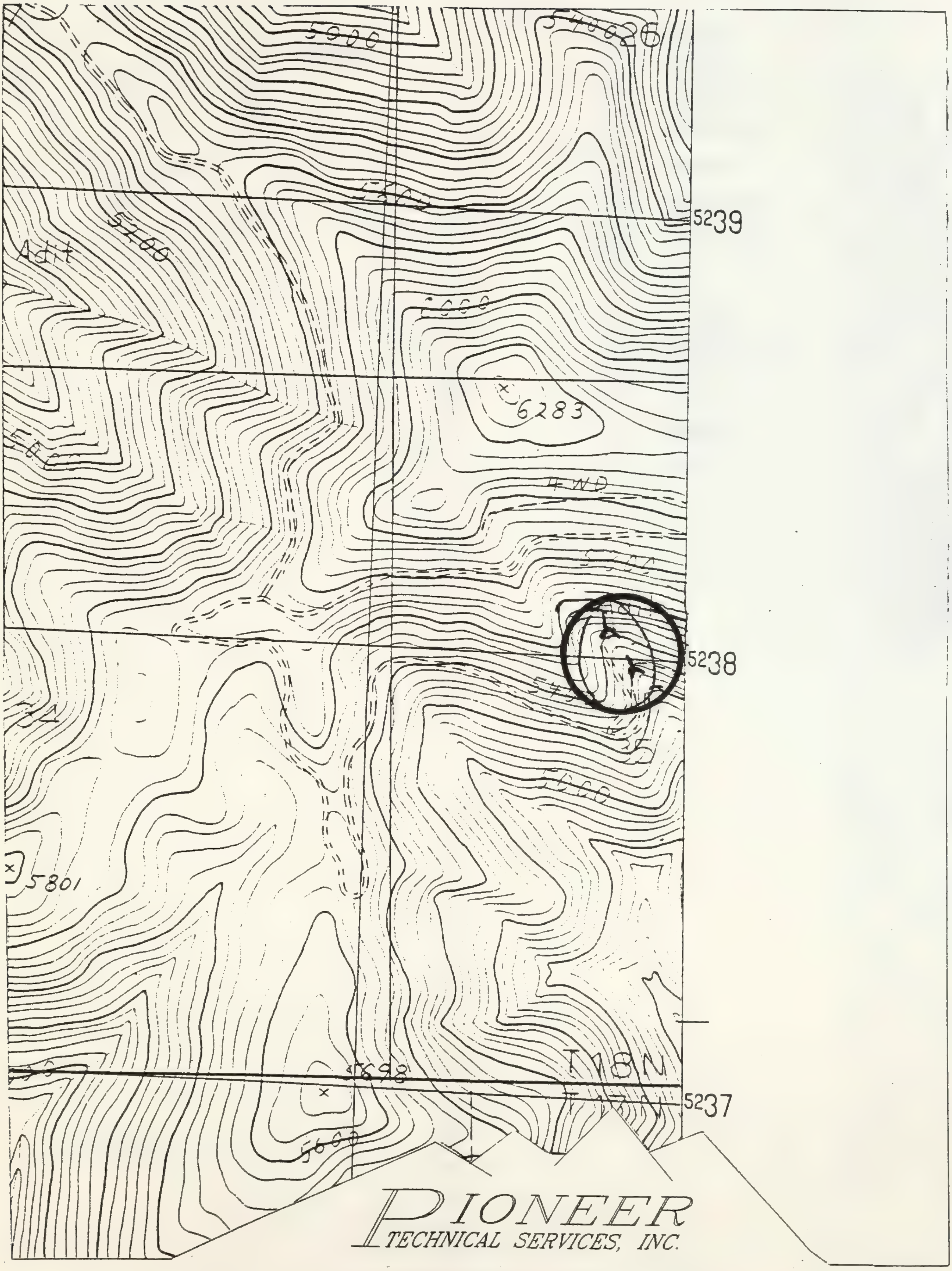
Other - Yes___, No_X_, #____, Comment

Mill Operation? Yes____, No_X_. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

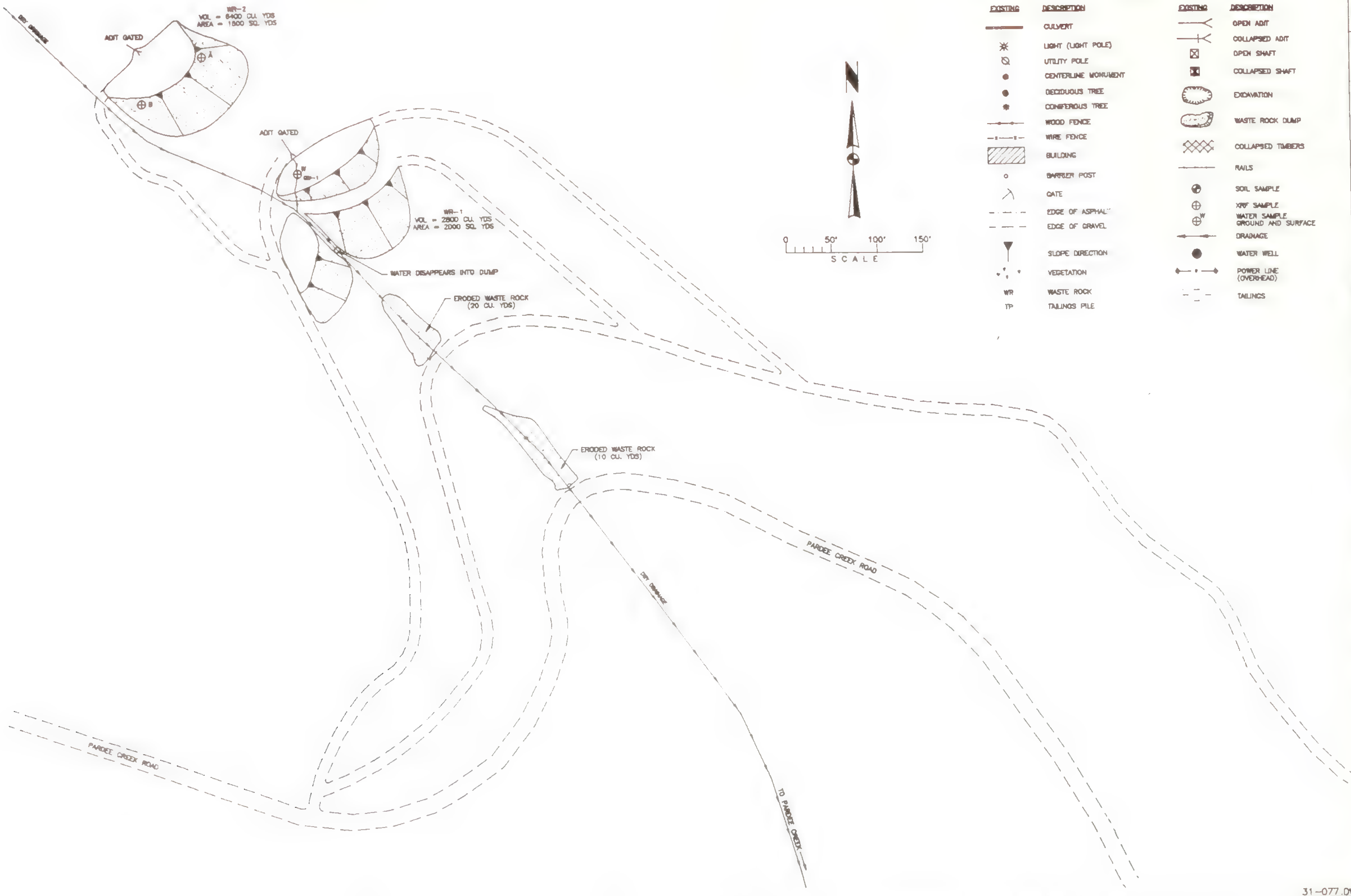


PIONEER
TECHNICAL SERVICES, INC.

LITTLE ANACONDA, P.A. NO. 31-077

T18N, R26W, SECTION 35

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION
▬	CULVERT
✳	LIGHT (LIGHT POLE)
⌀	UTILITY POLE
●	CENTERLINE MONUMENT
●	DECIDUOUS TREE
✱	CONIFEROUS TREE
—•—•—	WOOD FENCE
—x—x—	WIRE FENCE
▨	BUILDING
○	BARRIER POST
⌒	GATE
— · — ·	EDGE OF ASPHALT
— — —	EDGE OF GRAVEL
▼	SLOPE DIRECTION
∴	VEGETATION
WR	WASTE ROCK
TP	TAILINGS PILE

EXISTING	DESCRIPTION
—<	OPEN ADIT
—+<	COLLAPSED ADIT
⊠	OPEN SHAFT
■	COLLAPSED SHAFT
◯	EXCAVATION
◯	WASTE ROCK DUMP
✕✕✕	COLLAPSED TIMBERS
——	RAILS
◕	SOIL SAMPLE
⊕	XRF SAMPLE
⊕ W	WATER SAMPLE GROUND AND SURFACE
—◆—◆—	DRAINAGE
●	WATER WELL
◆— • —◆	POWER LINE (OVERHEAD)
- - -	TAILINGS

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LITTLE ANACONDA PA# 31-077
KEYSTONE DISTRICT MINERAL COUNTY

SHEET NO.

31-077.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,800	East side of WR-1	None	6.8 (D)	0.03	31-077-WR-1	07/23/93 1200	T-Metals, ABA
WR-1B	WR		West side of WR-1	None	6.7 (D)	0.04			
WR-2A	WR	6,400	On east side of WR-2	None	6.7 (D)	0.04			
WR-2B	WR		On west side of WR-2	None	6.4 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-077-WR-1 is composite of WR-1A and -1B, and WR-2A and -2B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No___, Number: 1 Identification: Caged lower adit is flowing at < 1 gpm

Filled shafts: Yes___, No X, Number:___ Identification:___

Seeps/Springs: Yes___, No X, Number:___ Identification:___

Groundwater wells within 4 miles?: Yes X, No___;
Number of well logs: 24

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite___, Probable___, Possible___, Unlikely X.
Carbonate rocks with small amounts of metals present in sources.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Discharge from lower adit	0.001 cfs (E)	8.75	490	238.2	6.3	223.3	N/A	31-077-GW-1	07/23/93 1030	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Unnamed tributary of Pardee Creek

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-1 in unnamed tributary

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:________, Average Flow:________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Adit discharge flows onto WR-1; dumps in drainage.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Pardee Creek has fishery, wetland; Clark Fork River has fishery, wetland, recreation, irrigation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes X , No_____, Distance downstream (ft)? 200 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Dumps are eroding into drainage and settling where drainage intersects roads - very steep. Dumps have deep erosion gullies formed.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 acre

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Host rock is Wallace Formation.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 3/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None; possible sulfides	Dry	18,000	18,000	Yes	Low
WR-2	None; possible sulfides	Dry	13,500	13,500	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_
Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe:
Hunting

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Little Anaconda, Mineral County, Form 39, 1975-1987.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Little Anaconda, Prepared by Northern Engineering and Testing, July 9, 1988.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-L, Author Unknown, Date Unknown.

USGS, Topographic Map, Plains, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

LITTLE ANACONDA
PA NO. 31-077

MDSL AMRB/PIONEER 4/9/93

Little Anaconda PA# 31-077
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 07/23/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–077–WR–1	39	22.6 J	3.6	11.4 J	2.1	15.4 J	47500	0.633 J	7050	12 J	2720 J	15 J	301 J	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.009 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–077–WR–1	0.11	3.44	139	135	<0.01	0.04	0.1	1.25	137

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31–077–GW–1	6.39	2.01 UX	2.57 U	9.7 U	9.2 J	1.9 J	55.9 J	0.038 U	11.3	12.7 U	7.43 J	30.7 U	60.7 J	261

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in m

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
31–077–GW–1	272	< 5.0	35	0.33	NR

LEGEND

WR1 – Composite of subsamples WR1A, 1B, 2A, and 2B.

GW1 – Discharge from lower adit.

BACKGROUND – From the Nancy Lee Mine (31–001–SS–1).

XRF ANALYSIS RESULTS

LITTLE ANACONDA
PA NO. 31-077

Mine Name: Little Anaconda PA# 31-077
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-077-WR1-A		33560.6	27562.5	1699.02	216.055 *	6874.22	35203.9			309.063		34.2381
31-077-WR1-B		38611	30321	1877.64	361.406 *	6476.56	36306			218.939		46.1375
31-077-WR2-A		27222.5	46844.7	1776.72		3481.79	22822.9			122.438 *		60.9415
31-077-WR2-B		30473.1	25797.2	1727.99	214.012 *	8165.83	38530.4			336.962		42.0633
31-077-WR-1-COMP		37578.4	32820.1	1974.88	253.646 *	6719.13	35223.1			277.878		42.9427

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-077-WR1-A	205.291			778.695	164.583			2936.23		13.4971 *	10.7268 *
31-077-WR1-B	188.34	37.1756 *		1816.62	158.983		70.2221 *	4450.44		12.5686 *	
31-077-WR2-A	226.879			701.21	148.154			2109.63		15.2066 *	13.0283 *
31-077-WR2-B	159.626			1986.77	151.499			3304.72	154.746 *		11.2281 *
31-077-WR-1-COMP	192.592			1273.59	169.206			3502.41			12.7335 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LITTLE ANACONDA
PA NO. 31-077

AIMSS SCORESHEET

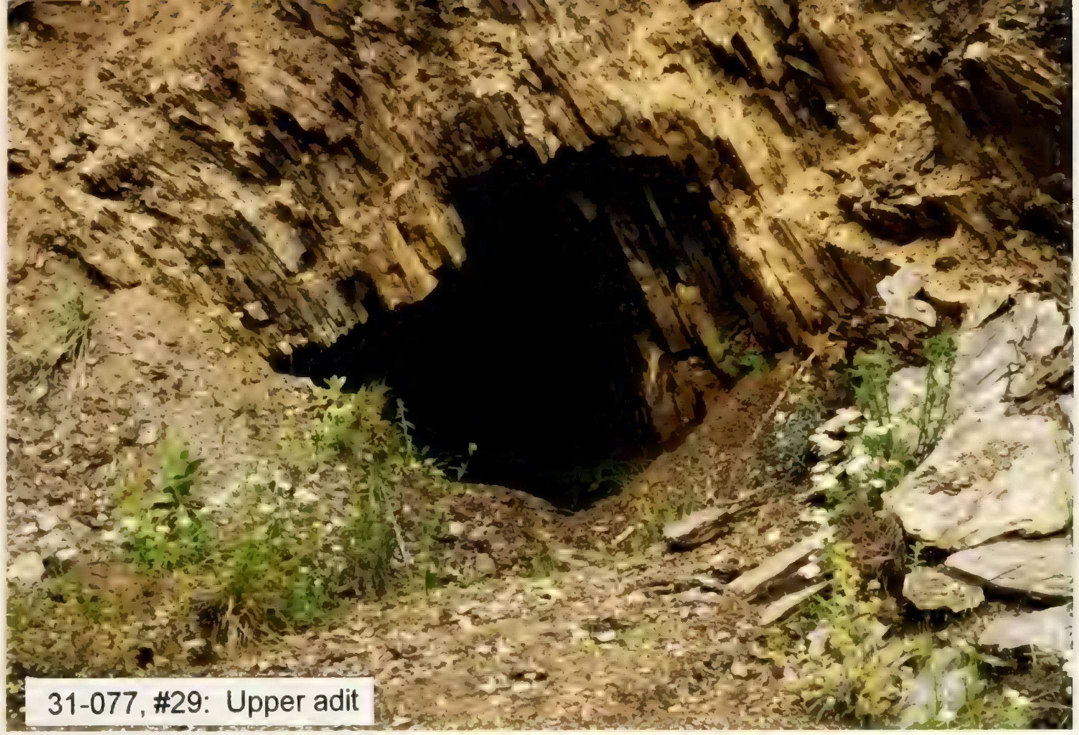
SITE NAME: LITTLE ANACONDA MINE
PA NUMBER: 31-077

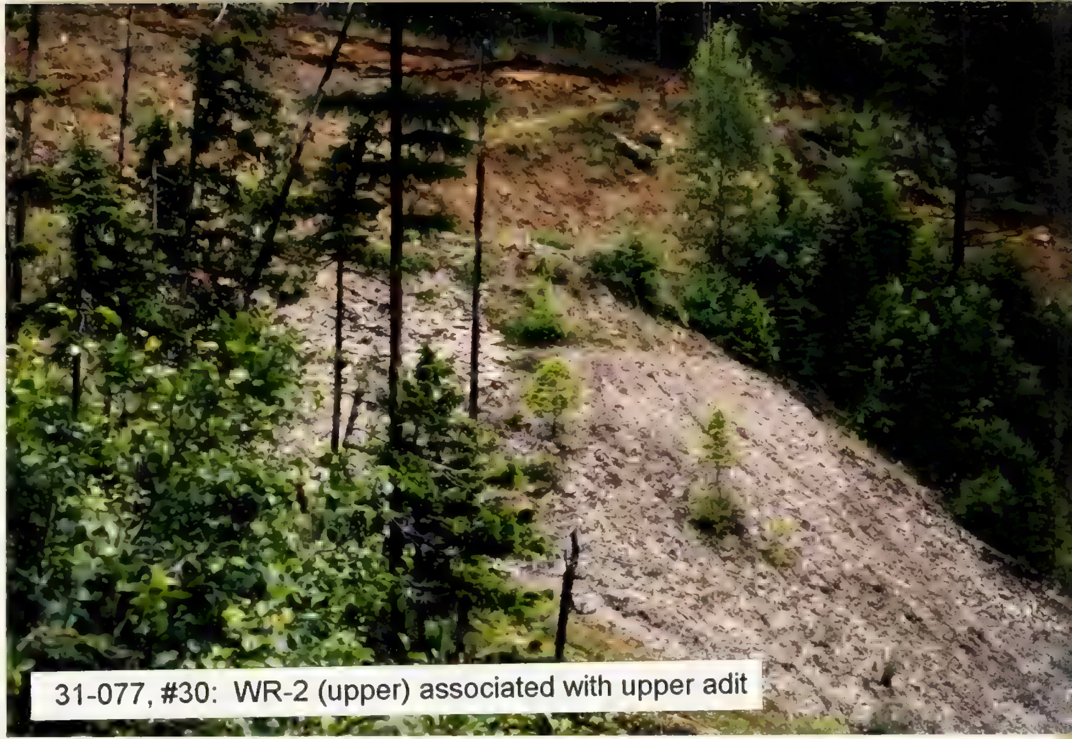
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	8.324
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		24
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	24.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	39955
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	9.276
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	81629
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.309
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	386
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.277
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	83
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**1.22**

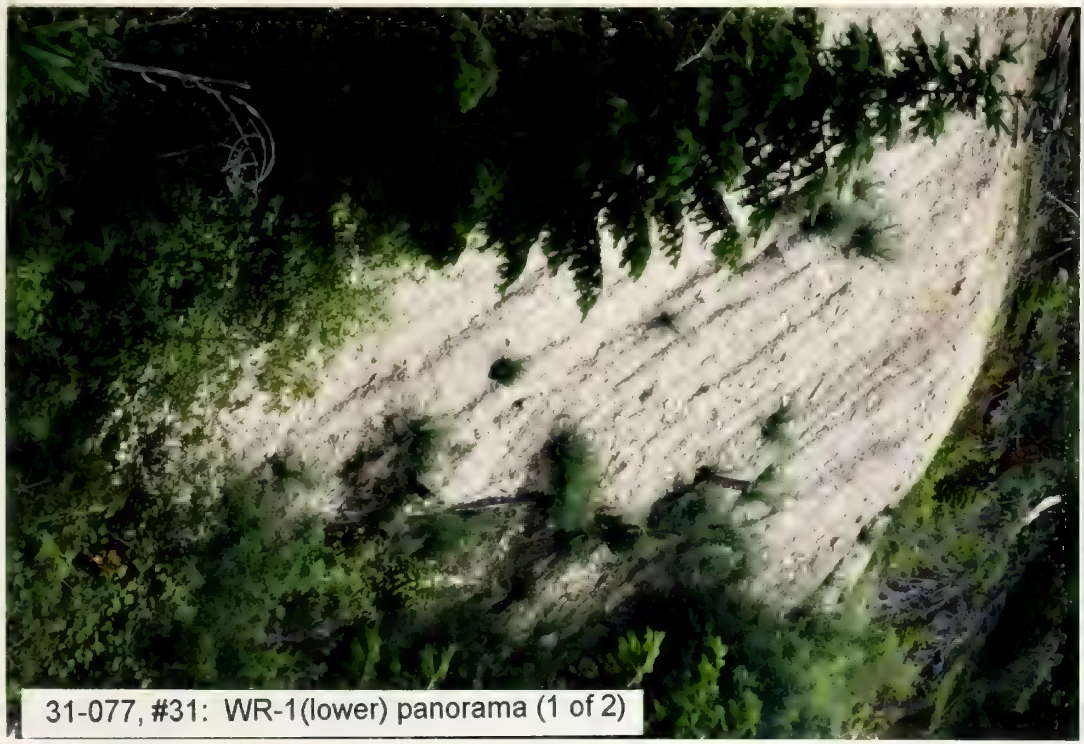
SITE NAME: LITTLE ANACONDA MINE
PA NUMBER: 31-077

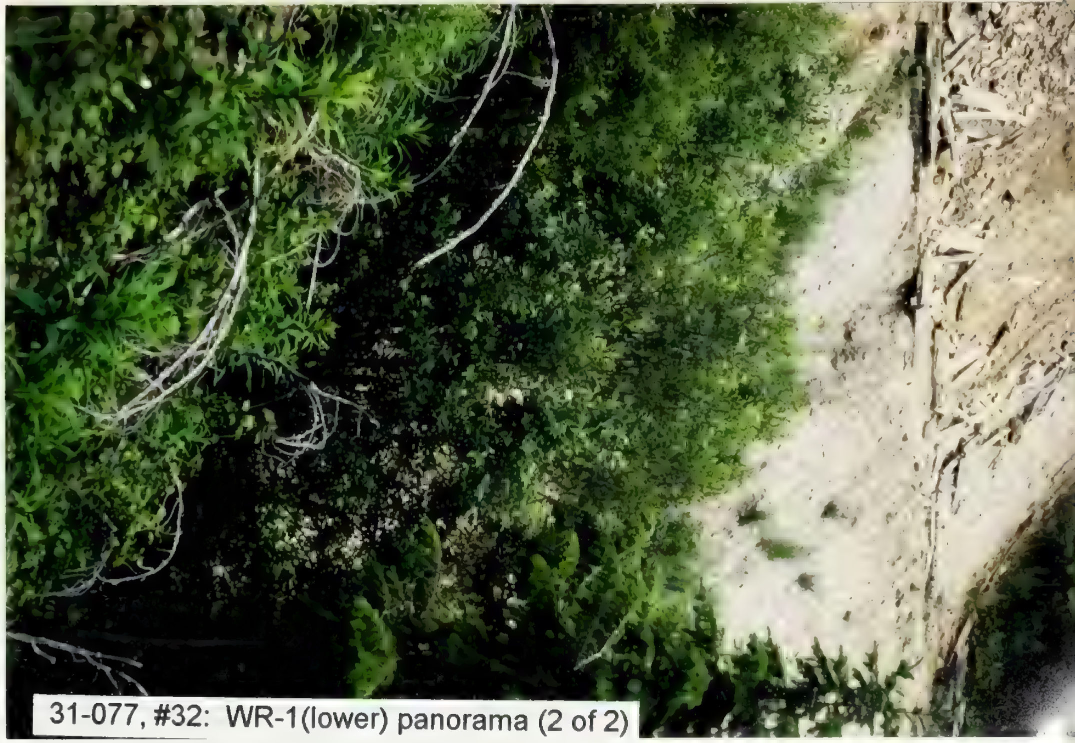
SITE SAFETY

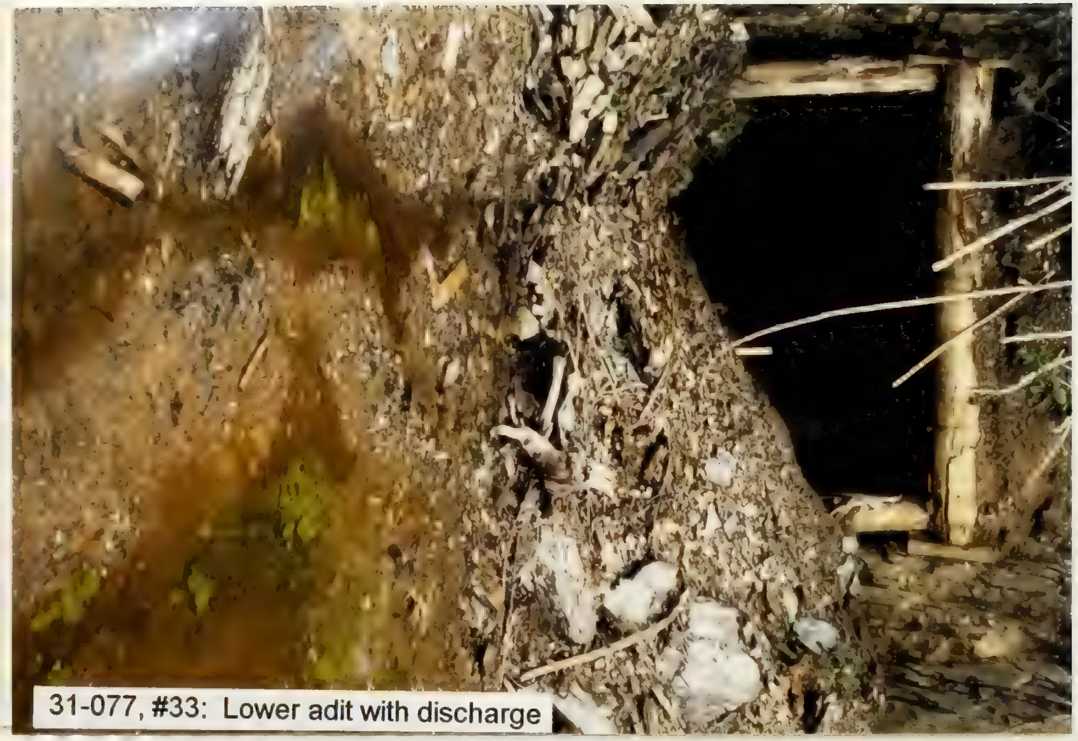
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


31-077, #29: Upper adit


31-077, #30: WR-2 (upper) associated with upper adit


31-077, #31: WR-1(lower) panorama (1 of 2)


31-077, #32: WR-1(lower) panorama (2 of 2)



31-077, #33: Lower adit with discharge

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: HOPKINS **PA#:** 31-078

Date: July 23, 1993 **Time:** 1230-1530

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Cloudy; rain.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #34: Adit on road; open with no dump; #35: Adit on road; open with no dump; No photos of dump or collapsed adits. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is revegetated on its own. Dump is unrecognizable. Two lower adits are caved and closed. Two adits above the site near the road are open HMOs.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: None required; no HMOs on-site; completely revegetated. Close adits above the site near road.

MDSL AMRB/PIONEER 4/9/93

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HOPKINS PA#: 31-078

Legal Description: T 18N ;R 26W ;Sec. 35 , SE1/4 SE1/4 ___1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 16' 10" Longitude: W 114° 51' 50"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Pardee Creek

USGS Quadrangle map name(s): Quinns Hot Springs

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Lolo National Forest.

Relationship to other mines/sites in the area/district: 3/4 mile southeast from Little Anaconda (31-077) site in Pardee Creek drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4700', Slope 20°,
Aspect Northwest and Southeast

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural___, Other(Specify) Cabin, 0.5 mile south of mine

Area of disturbed/unvegetated lands? None acres.
Dimensions:

Predominant vegetation types: Spruce, willows, grasses, cedar, Ponderosa pine

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).
Small road off of mine blocked by logging debris.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on north and south sides of Pardee Creek which drains to the Clark Fork River. Site is underlain by Belt (Wallace) limestones.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

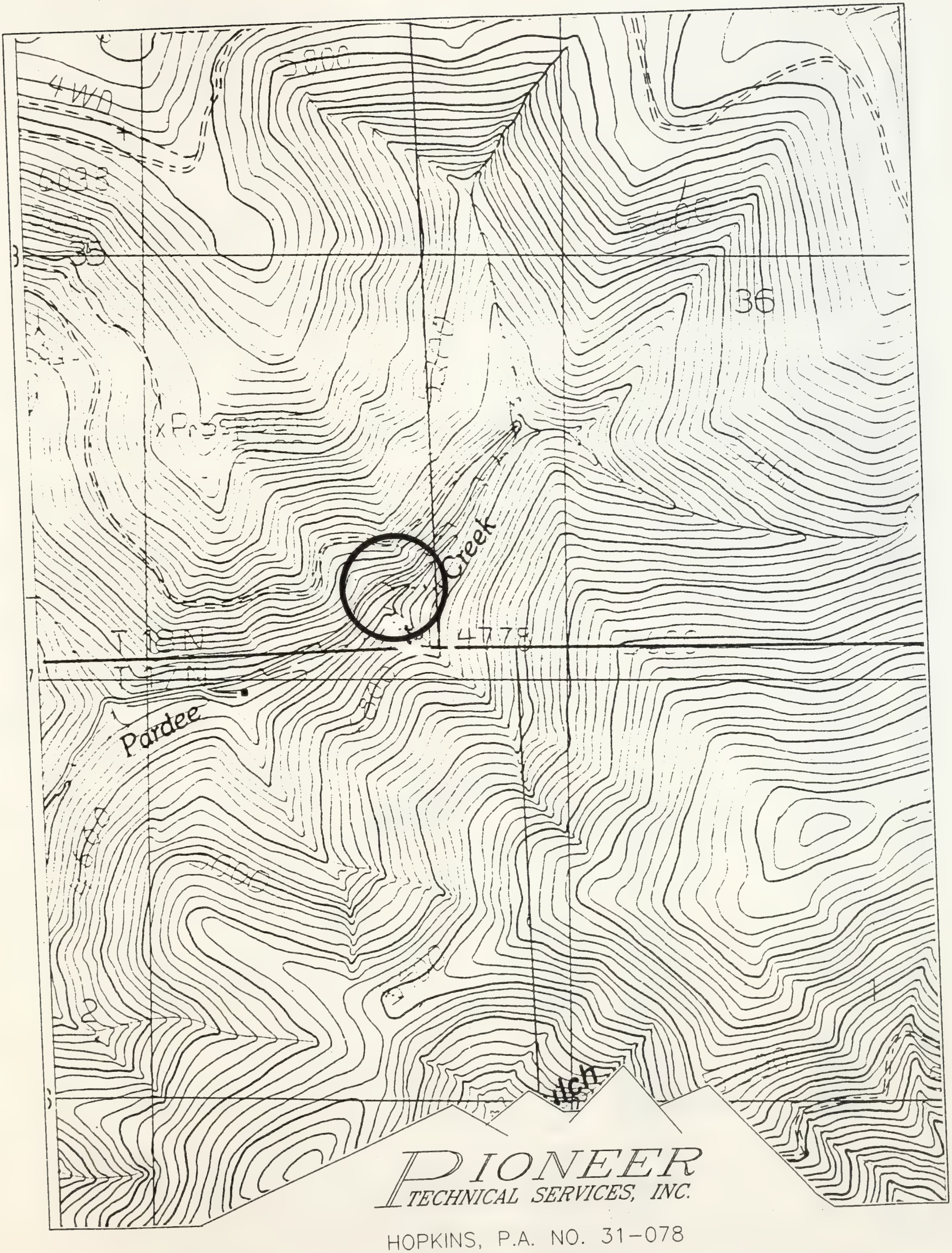
Shafts -	Yes___	No X	# ___	Comment
Adits -	Yes X	No___	# 4	Comment 2 caved; 2 open on road
Pits -	Yes___	No X	# ___	Comment
Placers -	Yes___	No X	# ___	Comment
Other -	Yes___	No X	# ___	Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

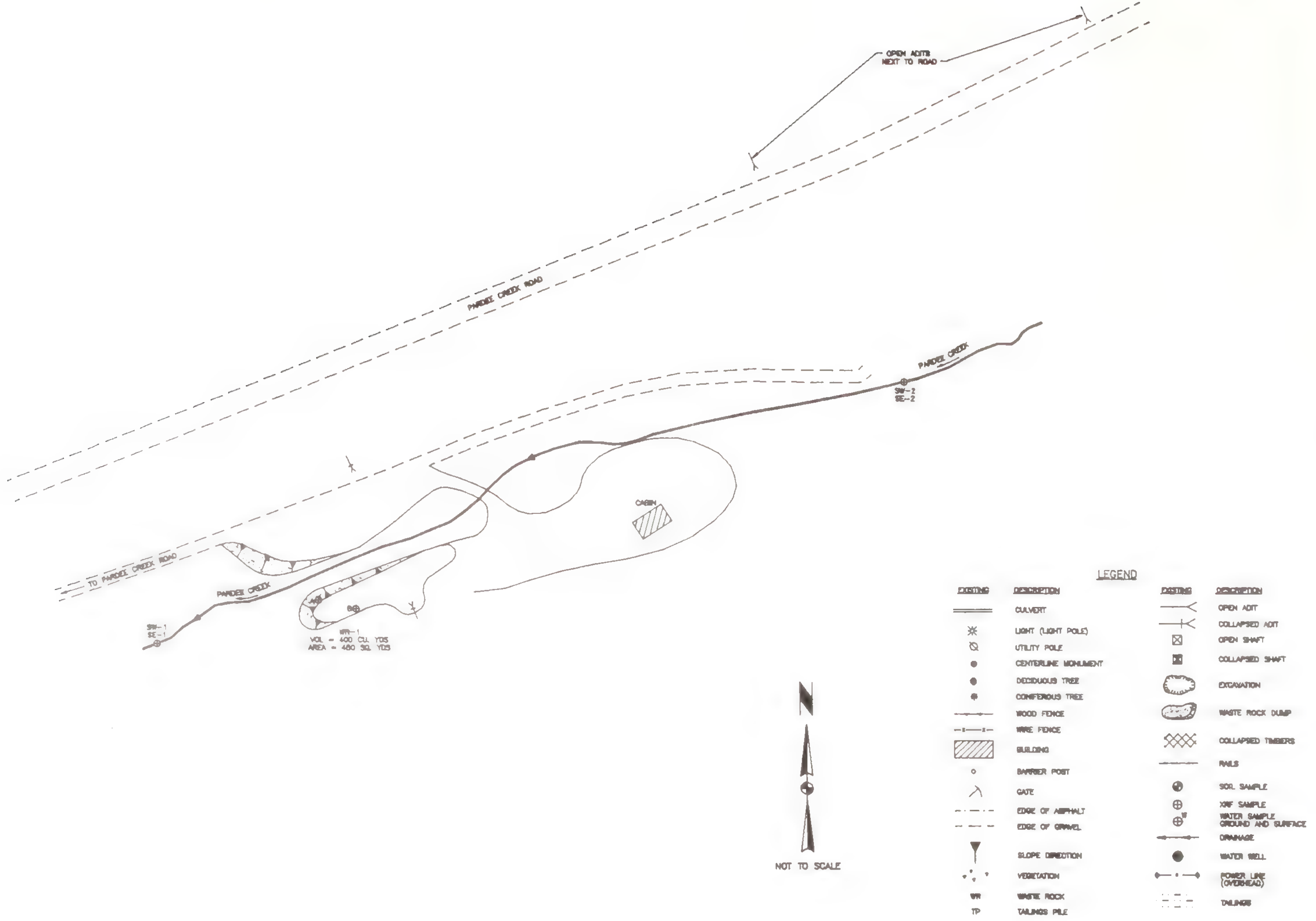
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

HOPKINS, P.A. NO. 31-078

T18N, R26W, SECTION 35
SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

HOPKINS PA# 31-078
KEYSTONE DISTRICT MINERAL COUNTY

SHEET NO.

31-078.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Belanger, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	400	On northwest end of WR-1	None	6.8 (D)	0.04	31-078-WR-1	07/23/93 1525	T-Metals, ABA
WR-1B	WR		Near center of dump on top	None	6.2 (D)	0.035			

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Dump is completely vegetated. 31-078-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 24

Distance to nearest well used for drinking? Cabin 1/2 mile; residences 2 miles.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Low metals; high pH in dump and water; completely revegetated.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC $\mu S/cm$ @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Pardee Creek

Dry streambeds: Yes ___, No X, Name(s):

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.57 during investigation
High Flow: 5 cfs, Average Flow: 0.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 5 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Possibly through waste rock dumps.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery, wetland in Pardee Creek; Clark Fork River has fishery, wetland, recreation, irrigation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downstream in Pardee Creek	8.99	380	306.5	7.5	248	0.56 cfs (M)	31-078-SW-1	07/23/93 1430	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downstream in Pardee Creek	N/A	N/A	N/A	N/A	N/A	N/A	31-078-SE-1	07/23/93 1430	T-Metals
SW-2	SW	Upstream in Pardee Creek	8.15	390	179	7.0	191	0.58 cfs (M)	31-078-SW-2	07/23/93 1500	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upstream in Pardee Creek	N/A	N/A	N/A	N/A	N/A	N/A	31-078-SE-2	07/23/93 1500	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 3 acres

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/2 mile (cabin) or 2 miles (residence)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	4,050	0	Yes	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_, Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_______ Hunting

Accessibility - Fences, warning signs, closed roads? Access road is blocked, but easy access by foot.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:___ Open adits along Pardee Creek Road.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_ Old cabin on-site.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Hopkins mine, Prepared by Northern Engineering and Testing, July 8, 1988.

USGS, Topographic Map, Quinns Hot Springs, Montana, 7 1/2 Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

HOPKINS
PA NO. 31-078

Hopkins PA# 31–078
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 07/23/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–078–SE–1	34	209 J	5.3	10.8 J	10.9	40.1 J	17800	1.98 J	849	12 J	1600 J	17 U	1080 J	NR
31–078–SE–2	14	22.4 J	0.7	3.2 J	3	8.9 J	14300	0.12 J	732	9 J	173 J	7 U	184 J	NR
31–078–WR–1	18	39.5 J	4.5	4.4 J	2.6	9 J	13300	0.558 J	1130	6 J	469 J	6 U	417 J	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.009 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–078–WR–1	0.08	2.5	130	128	<0.01	0.05	0.04	1.56	129

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31–078–SW–1	2.88	4.87 JX	2.57 U	9.7 U	6.83 U	1.87 J	36.5 J	0.038 U	4.08 U	12.7 U	3.49 J	30.7 U	7.57 U	200
31–078–SW–2	2.53	4.8 JX	2.57 U	9.7 U	6.83 U	2.07 J	38.9 J	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	193

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
31–078–SW–1	215	< 5.0	6	0.05	NR
31–078–SW–2	209	< 5.0	6	0.05	NR

LEGEND

SE1 – Downstream in Pardee Creek.
SE2 – Upstream in Pardee Creek.
WR1 – Composite of subsamples WR1A and 1B.
BACKGROUND – From the Nancy Lee Mine (31–001–SS–1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

HOPKINS
PA NO. 31-078

MDSL AMRB/PIONEER 4/9/93

Mine Name: Hopkins PA# 31-078
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-078-WR1-A		27972.8	64672.8	1646.89		2318.55	16133.8			580.422		73.8519
31-078-WR1-B		25426.7	8060.78	2221.05		899.65 *	19178.7			149.708		69.3569
31-078-WR1-B-DUP		24628.9	8058.02	2158.67		727.25 *	19220.9			152.78		71.7491
31-078-WR-1-COMP		25615	26028.6	1995.92		1546.58	20000.7			358.013		63.8203

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-078-WR1-A	194.219			730.056	140.114		63.0884 *	2657.58		12.4499 *	11.5079 *
31-078-WR1-B	205.948	41.6576 *		208.797	152.265			958.798		11.7451 *	13.414 *
31-078-WR1-B-DUP	198.181			204.457	143.947			955.336		11.7974 *	9.21318 *
31-078-WR-1-COMP	183.263	35.85 *		588.066	143.938			1758.62		15.0449 *	17.7742 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

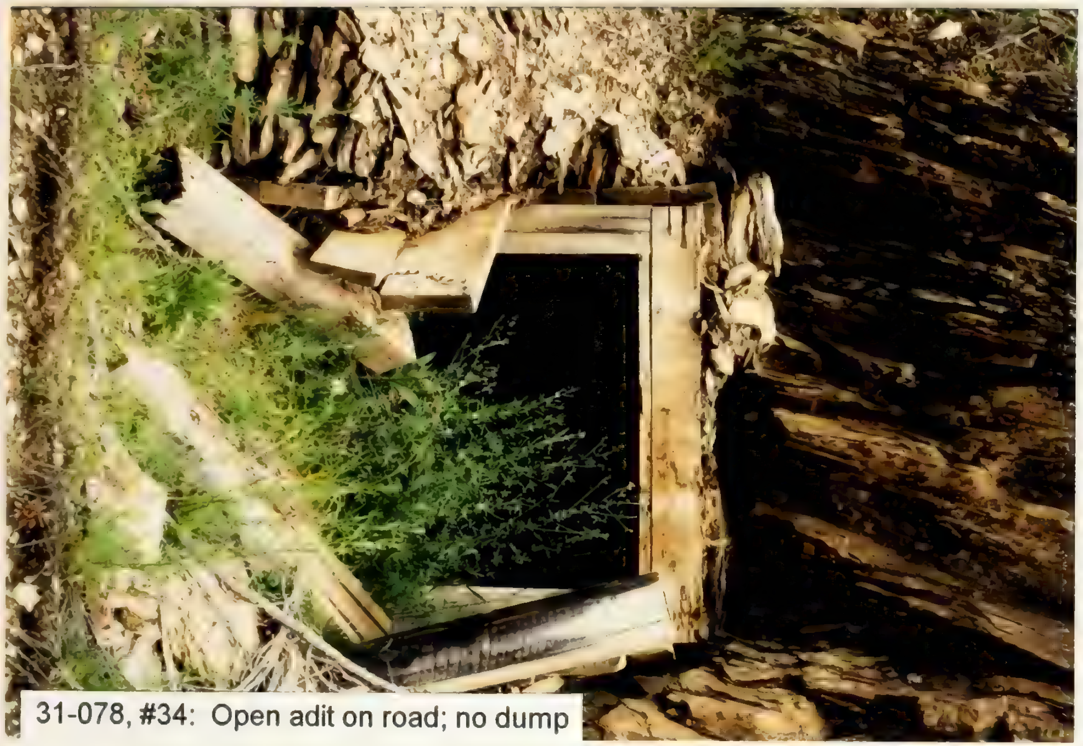
HOPKINS
PA NO. 31-078

AIMSS SCORESHEET

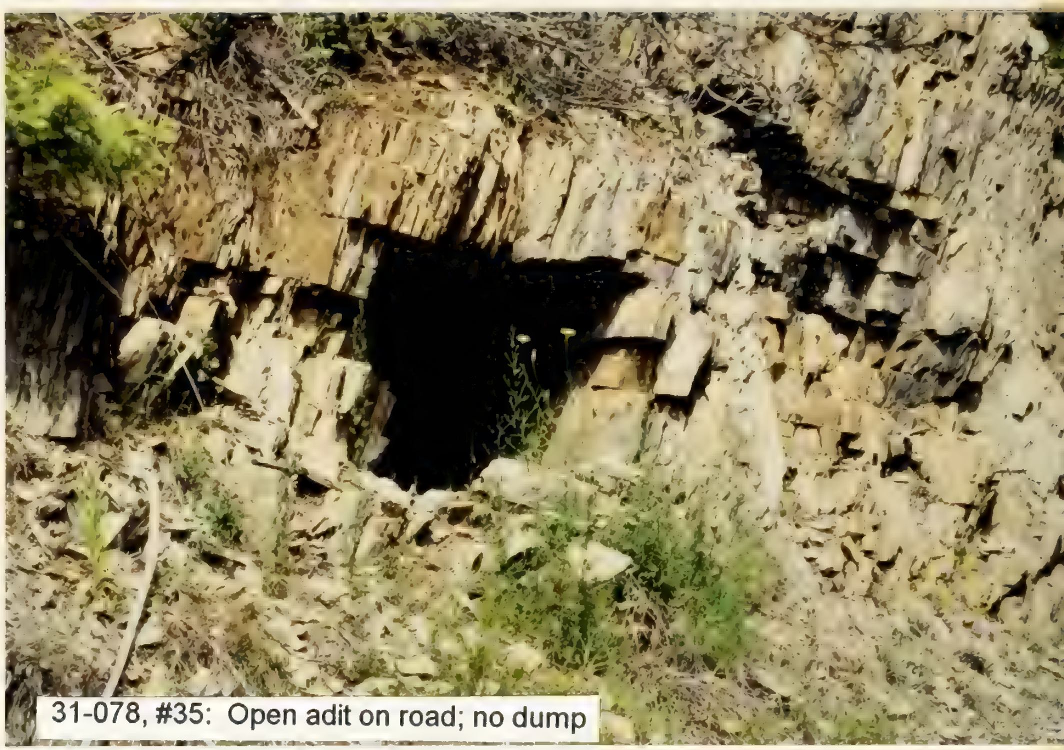
SITE NAME: HOPKINS
PA NUMBER: 31-078

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.145
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		24
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	24.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1392
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.162
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2495
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	16
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	3
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.04**

LINE NO.		SITE SAFETY	SITE NAME: PA NUMBER:	HOPKINS 31-078
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	140
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	3
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**8.40**



31-078, #34: Open adit on road; no dump



31-078, #35: Open adit on road; no dump

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NANCY LEE MILLSITE **PA#:** 31-082

Date: August 2, 1993 **Time:** 1103-1930

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; hot; slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: TP-1B; #18: SW-1 location; #19: Upper floodplain tailings; #20: Lower floodplain tailings; #21: Downstream tailings. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Tailings in floodplain for one mile down unnamed (Mill Gulch?) drainage; not observed in Keystone Creek.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Move out of floodplain or revegetate. Some natural revegetation occurring in lower drainage.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NANCY LEE MILLSITE PA#: 31-082

Legal Description: T 17N ;R 26W ;Sec. 5 , NW1/4 ___1/4 ___1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 15' 55" Longitude: W 114° 56' 21"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Keystone Creek

USGS Quadrangle map name(s): Keystone Peak

Mine Type/Commodities: Millsite/Copper, Silver, Lead, Zinc, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Garth Crosby, Nancy Lee Mines, Inc., P.O. Box 968, Osburn, ID 83849; Lolo National Forest.

Relationship to other mines/sites in the area/district: Directly below Nancy Lee Mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3400' , Slope 21° ,
Aspect Southwest

Land use: Mining X , Recreational X , Residential X , Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3 acres.
Dimensions: Flumed down drainage with a total of 3 acres disturbance; approx. 1 mile long by approx. 50 feet wide.

Predominant vegetation types: Lodgepole pine, Ponderosa pine, shrubs, knapweed

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites).
Locked gate

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in unnamed drainage on northwest side of Keystone Creek. Groundwater discharging from an adit is the source of flow in this tributary; it is unknown whether it is perennial or intermittent. Water in unnamed tributary flows east across tailings and then south (Mill Gulch?) to confluence with Keystone Creek. Keystone Creek, which is perennial, is approx. 4/10 mile downgradient and flows southwest away from the site. Site is underlain by Precambrian rocks of the Ravalli Group.

Mining/milling history, ore type/tenor, host rock, gangue: Nancy Lee mine just upstream was fissure filling and banded replacement veins in sheared Burke and Revett formations near the Osborn fault. Gangue consisted of altered quartzite, quartz, and siderite. Production records 1901 through 1953 for mine (unknown how much ore went through the mill); 340 oz. Au; 176,722 oz. Ag; 494,958 lbs. Cu; 2,474,715 lbs. Pb; 505,870 lbs. Zn from 52,034 tons of concentrate sent to smelter.

Mine Operation?
Shafts - Yes___, No X, # ____, Comment____
Adits - Yes___, No X, # ____, Comment____
Pits - Yes___, No X, # ____, Comment____
Placers - Yes___, No X, # ____, Comment____
Other - Yes___, No X, # ____, Comment____

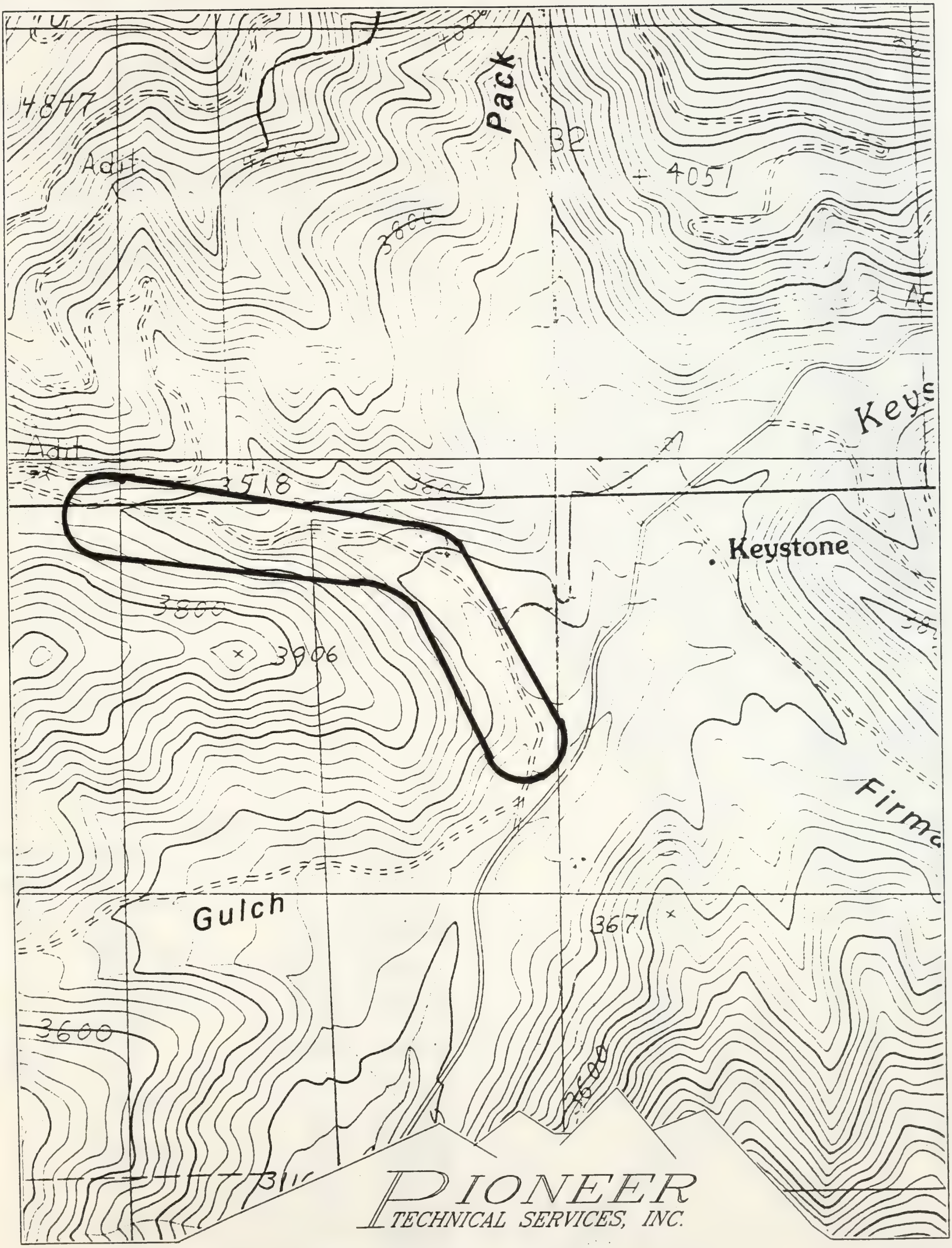
Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: Unknown; tailings were found, no millsite was seen.

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting? A 50 tpd gravity floatation mill was reported associated with the mine in 1967 through 1969 which was producing Cu, Ag, and Pb concentrate for shipment to East Helena and Bunker Hill. No mill building was seen on-site; therefore, cannot confirm it was the same one which produced the tailings.

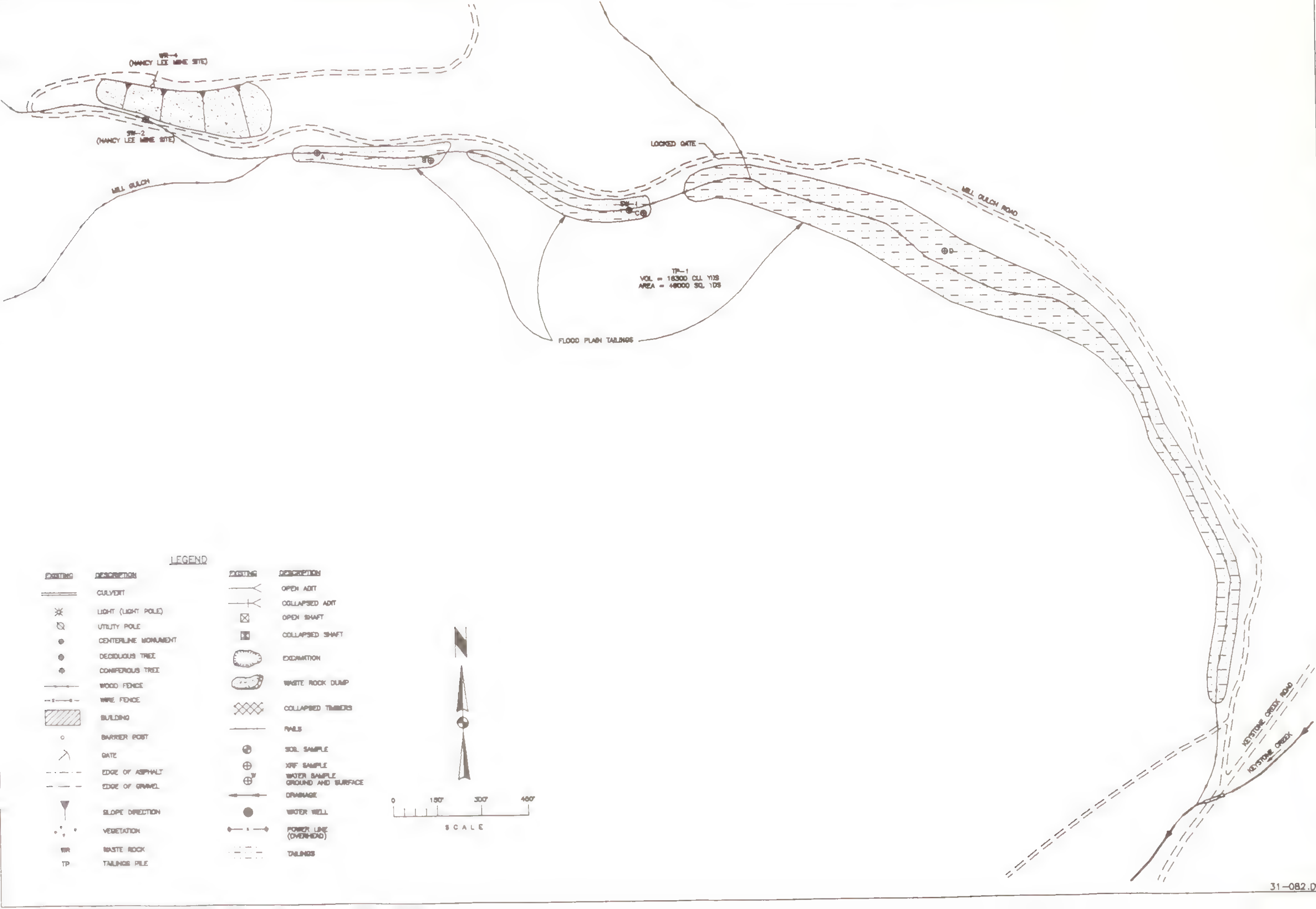
Well No.	Location	Depth	Yield	Static Water Level
M.[illegible]3122	17N 26W 04 DAD	95.0	25.0	12.00



NANCY LEE MILL, P.A. NO. 31-082

T17N, R26W, SECTION 05

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NANCY LEE MILLSITE PA# 31-082
KEYSTONE DISTRICT MINERAL COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

SHEET NO.

31-082.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 60% sand; 30% silt; 10% clay.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Tailings were flumed down drainage with maximum depths of approx. 4 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Primarily dry.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundments.

Comments on potential for mitigation: Remove tailings from drainage or revegetate in place with drainage routing.

SOURCE INVENTORY FORM

SAMPLERS: Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	16,333	West end of floodplain tails near Nancy Lee mine; 0′-1′	None	6.8 (D)	0.04	31-082-TP-1	08/02/93 2030	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
TP-1B-A	TAIL		Near tailings dam in drainage; 0′-1′	None	6.8 (D)	0.04			
TP-1B-B	TAIL		1000′ downstream; 1′-3′	None	6.8 (D)	0.04			
TP-1B-C	TAIL		1000′ downstream; 3′-5′	None	5.6 (D)	0.04			
TP-1C	TAIL		Near road crossing, 2000′ downstream; 0′-1′	None	5.6 (D)	0.03			
TP-1D	TAIL		3000′ downstream at dump site; 0′-2′	None	5.8 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Tailings were dug instead of augered. 31-082-TP-1 is composite of TP-1A, TP-1B-A through -1B-C, TP-1C and TP-1D.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:____ Identification:______

Filled shafts: Yes___, No X, Number:____ Identification:______

Seeps/Springs: Yes___, No X, Number:____ Identification:______

Groundwater wells within 4 miles?: Yes X, No___,
Number of well logs: 83

Distance to nearest well used for drinking? Approx. 1/4 mile in Keystone.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X, Unlikely____.
Water flows over a portion of the tailings then reenters the ground.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ____, Name(s): No name (possibly Mill Gulch); discharge from waste rock of Nancy Lee mine, which then flows over tailings.

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Tailings lie within drainage.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Water is from adit; no flood frequency or seasonal flow is available.

High Flow: ________, Average Flow: ________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,

Describe: Discharge from adit, then flows over tailings

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, agriculture, fishery, recreation, wetlands (Clark Fork).

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 5000' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings in floodplain from Nancy Lee mine to confluence with Keystone Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALISES
SW-1	SW	Middle of floodplain tailings just before water goes back into the ground	8.57	179	126	25	220	2 gpm (E)	31-082-SW-1	08/02/93 1700	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-2	SW	Below WR-4 at Nancy Lee Mine	8.27	155	31	26.6	341	1 gpm (E)	31-001-SW-2	08/02/93 1630	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Two acres

Wetlands present: Yes X , No ___, Describe: Small area but with potential.

Carbonate rocks/soils: Yes X , No ___, Describe: Waste rock dumps at Nancy Lee mine contain carbonate rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Belanger, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	FEOX present; moderate vegetation; presence of ESD	Dry	441,000	308,700	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe:_______
Hunting

Accessibility - Fences, warning signs, closed roads? Locked gate
year-long by Forest Service.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment_______________
Wilderness Area - Yes___, No_X_, Comment_______________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment_______________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:_______________

Bibliography

MBMG, State Technical Services Mine Visit Report, February 28, 1969.

MBMG, State Technical Services Mine Visit Report, November 16, 1967.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Nancy Lee Millsite, Prepared by Northern Engineering and Testing, July 6, 1988.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-I, Author Unknown, Date Unknown, pp. 590-593.

USGS, Topographic Map, Keystone Peak, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

NANCY LEE MILLSITE
PA NO. 31-082

Nancy Lee Millsite PA# 31-082
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31-082-TP-1	540	27.6	14.4	15.9	2.58	4630 J	66800	1.19 J	5340	2.38 U	10500 J	1230	9350	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.01 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31-082-TP-1	0.69	21.6	5.80	-15.8	<0.01	0.06	0.70	1.87	2.98

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31-082-SW-1	4.84	43.1	2.57 U	9.7 U	6.83 U	15.7	34.8	0.054 J	8.2	12.7 U	18.7	30.7 U	53.2	314
31-001-SW-2	274	28	2.57 U	9.8 U	14.6	1.55 U	13200	0.038 U	7300	27	1.55 U	30.7 U	7.57 U	540

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
31-082-SW-1	404	5.7	120	< 0.05	NR
31-001-SW-2	684	5.7	214	< 0.05	NR

LEGEND

TP1 - Composite of subsamples TP1A, 1BA through 1BC, 1C, and 1D.

BACKGROUND - From the Nancy Lee Mine (31-001-SS-1).

SW1 - Middle of floodplain tailings just before water goes into ground.

31-001-SW-2 - Upstream sample for this site from the Nancy Lee Mine.

XRF ANALYSIS RESULTS

NANCY LEE MILLSITE
PA NO. 31-082

MDSL AMRB/PIONEER 4/9/93

Nancy Lee Millsite PA# 31-082
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-082-TP1B-A			2576.02	606.233		16085.7	169072		3073	14460	1141.54	34.4745 *
31-082-TP1B-B			1767.69	377		2241.16	23623.8		2410.31	3673.89		10.8301 *
31-082-TP1B-C			2206.4	400.477		3642.39	29832.9		2777.21	9667.63		12.905 *
31-082-TP1-A			4179.52	811.7	155.977 *	1762.73	25704.2		2026.31	2735.69		38.0608
31-082-TP1-C			2644.95	856.1	149.555 *	4451.95	47577.8		2318.5	3443.3		36.3781
31-082-TP1-D			3553.94	875.834		5242.48	49847.6		1952.93	2160.7		28.2217
31-082-TP-1-COMP			2422.35	526.133	122.391 *	4872.99	49925.5		2381.2	5598.25		24.1669 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-082-TP1B-A	96.5964			9239.54		373.506 *	1963.43	35.6785 *	243.816 *		
31-082-TP1B-B	65.4167			2160.2	27.3163 *		1678.01	62.6308	113.604 *		
31-082-TP1B-C	75.4708			6296	30.5788 *	133.736 *	2628.92	75.3648	204.547 *		
31-082-TP1-A	125.955			5529.13	81.998		1195.82	424.531	106.164 *		
31-082-TP1-C	195.974			6302.89	40.1858 *		1856.64	183.421	188.056 *		
31-082-TP1-D	204.01			4479.86	47.0551 *		1257.98	191.213	116.535 *		
31-082-TP-1-COMP	109.703			5454.08	31.4972 *		1619.17	167.796	156.662 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NANCY LEE MILLSITE
PA NO. 31-082

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

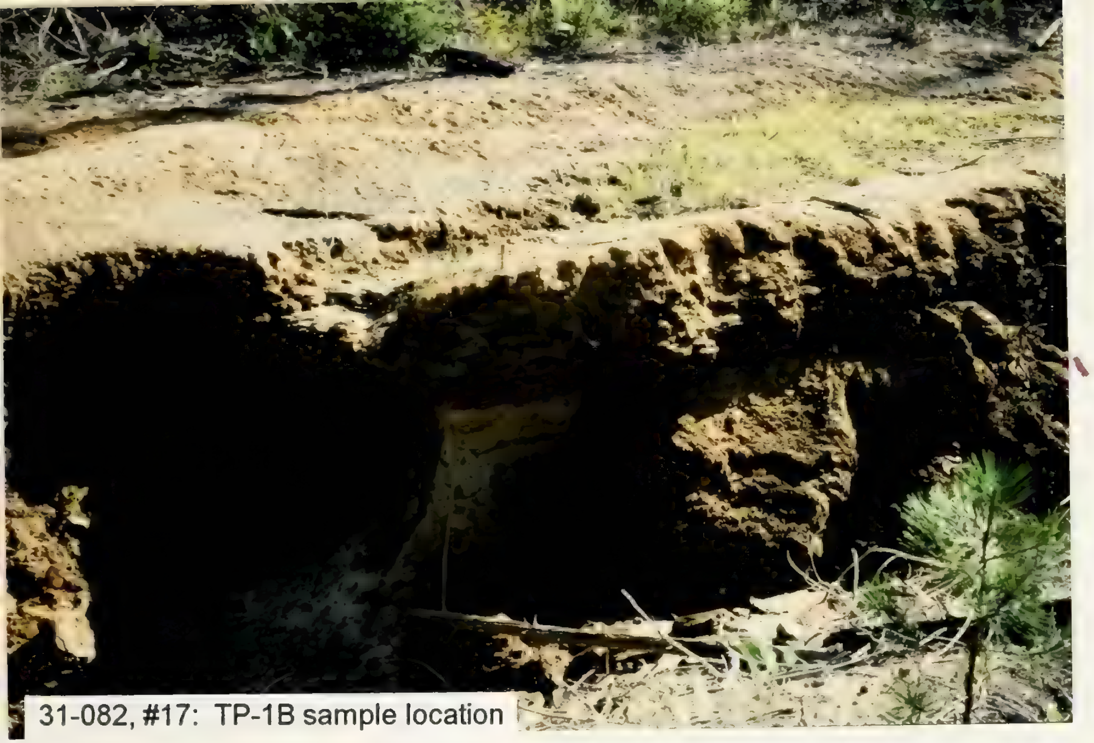
SITE NAME: NANCY LEE MILLSITE
PA NUMBER: 31-082

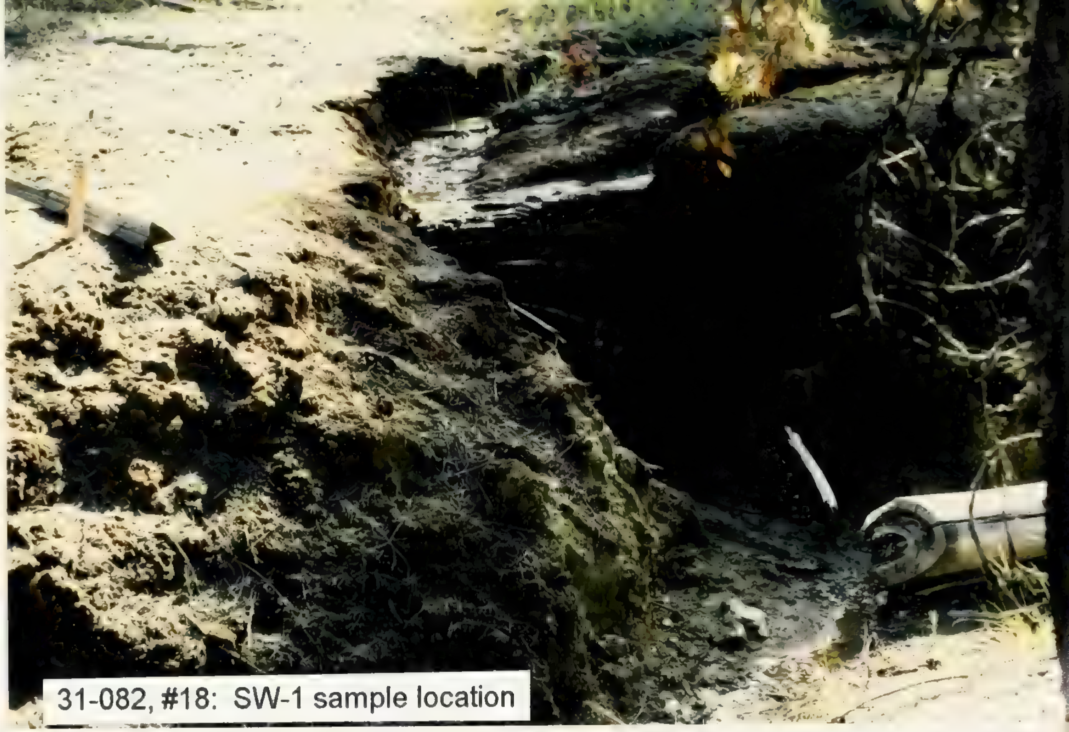
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	122.752
6		WELLS - 1 MI. x 2.5		2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		82
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	89.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	4394522
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	134.468
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		5
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	27
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2904509
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.447
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	25213
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.275
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	3
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3683
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**73.28**

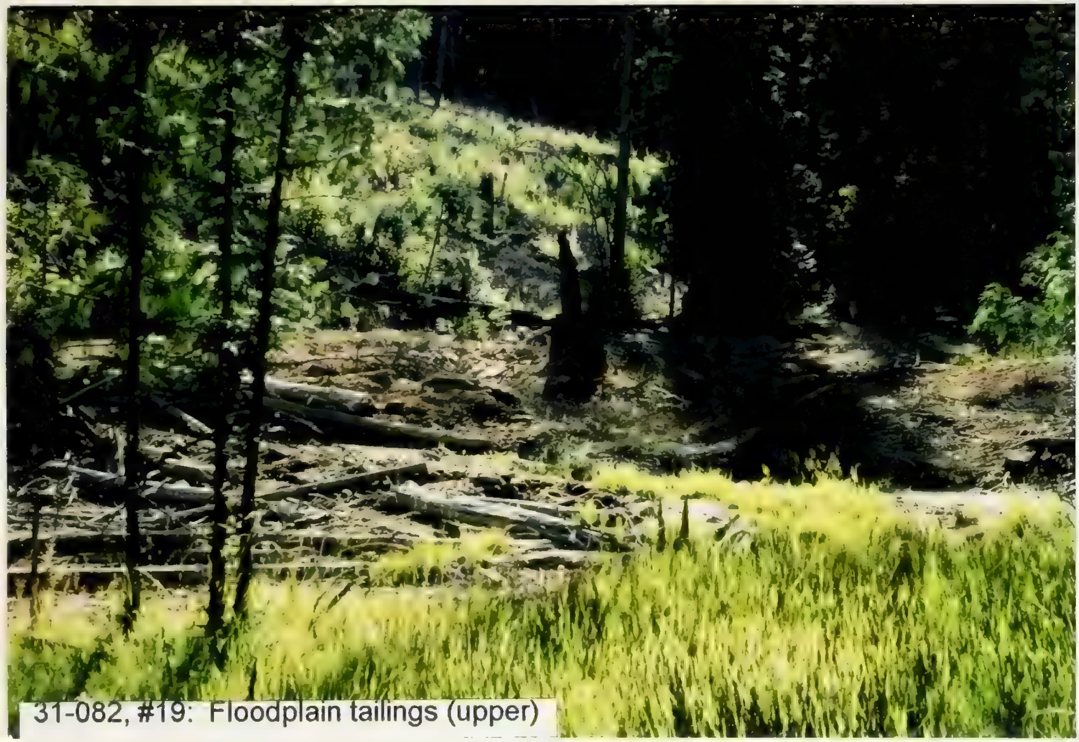
SITE NAME: NANCY LEE MILLSITE
PA NUMBER: 31-082

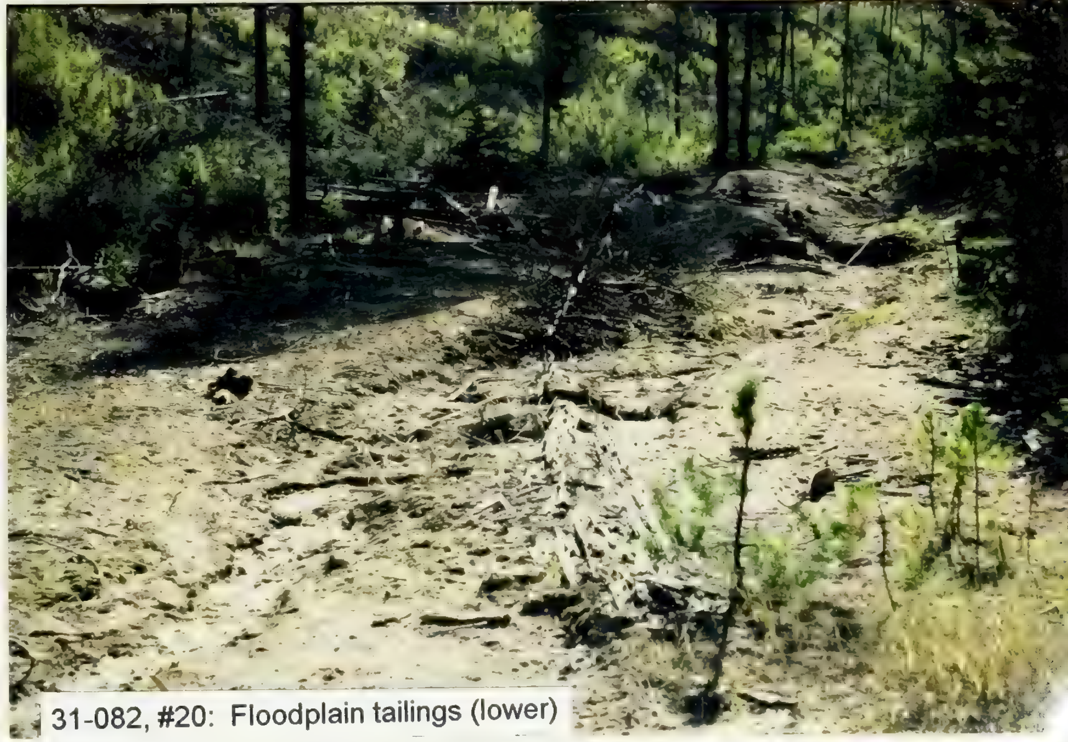
SITE SAFETY

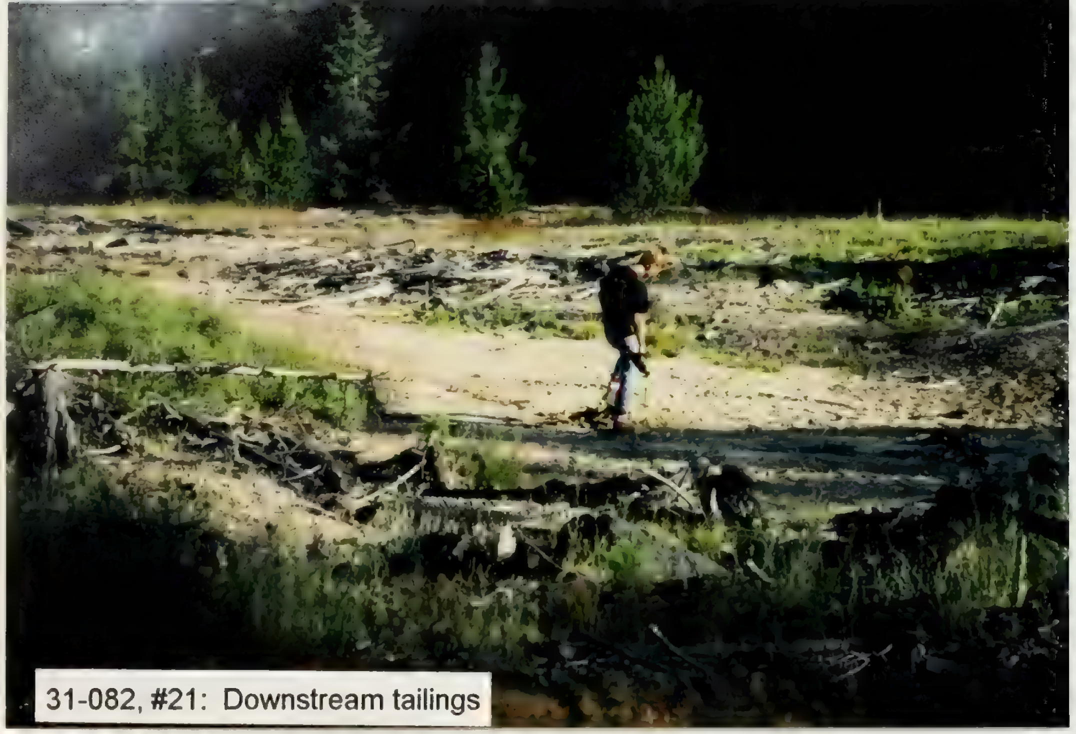
LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	3
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


31-082, #17: TP-1B sample location


31-082, #18: SW-1 sample location


31-082, #19: Floodplain tailings (upper)


31-082, #20: Floodplain tailings (lower)



31-082, #21: Downstream tailings

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NANCY LEE MILLSITE - SLOWEY **PA#:** 31-090

Date: September 7, 1993 **Time:** 1300-1830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Clear; approx. 85°; slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #34: TP-1 and mill; #35: TP-2 and TP-3; #36: Southwest end of TP-1 and Clarkfork River. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: Small quantities of lube oil

General Comments on Potential Remedial Alternatives: Study potential runon/runoff control, capping and revegetation; groundwater impacts. There is potential to reprocess.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NANCY LEE MILLSITE - SLOWEY PA#: 31-090

Legal Description: T 17N ;R 27W ;Sec. 14 , NW1/4 ___ 1/4 ___ 1/4

County: MINERAL Mining District: KEYSTONE

Latitude: N 47° 14' 19" Longitude: W 115° 00' 25"

Primary Drainage Basin and Code: Clark Fork River/17010204
Secondary Drainage Basin: Slowey Gulch

USGS Quadrangle map name(s): Wilson Gulch

Mine Type/Commodities: Millsite/Gold, Silver, Lead, Copper

Activity Status: Active ___, Inactive/Exploration ___, Abandoned X .

Ownership status: Known Y X N ___; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Nancy Lee Mines, Inc., J.F. Cowley, Jr., P.O. Box 1080, Kellogg, ID 83837.

Relationship to other mines/sites in the area/district: Replaced the old Nancy Lee Mill (31-082); ore was obtained at the Nancy Lee Mine (31-001).

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 2660' , Slope 0°-5° , Aspect Eastern

Land use: Mining ___, Recreational ___, Residential X , Urban ___, Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? 8 acres.
Dimensions: ___

Predominant vegetation types: Ponderosa pine, Douglas fir, cottonwoods, sage brush

Access: roads - good X , poor ___, 4wd ___, trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 25 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is located approx. 200 feet from the Clark Fork River. The site is underlain by alluvium of the Clark Fork valley.

Mining/milling history, ore type/tenor, host rock, gangue: Nancy Lee Mines, Inc., bought the property in 1944 and milled ore from 1945 to 1973. Ore came from the Nancy Lee Mine (31-001) in Keystone Gulch. Some ore was also brought in from the Nine Mile district by a lessee towards the end of its operating period.

Mine Operation?
Shafts - Yes___, No X , # _____, Comment
Adits - Yes___, No X , # _____, Comment
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

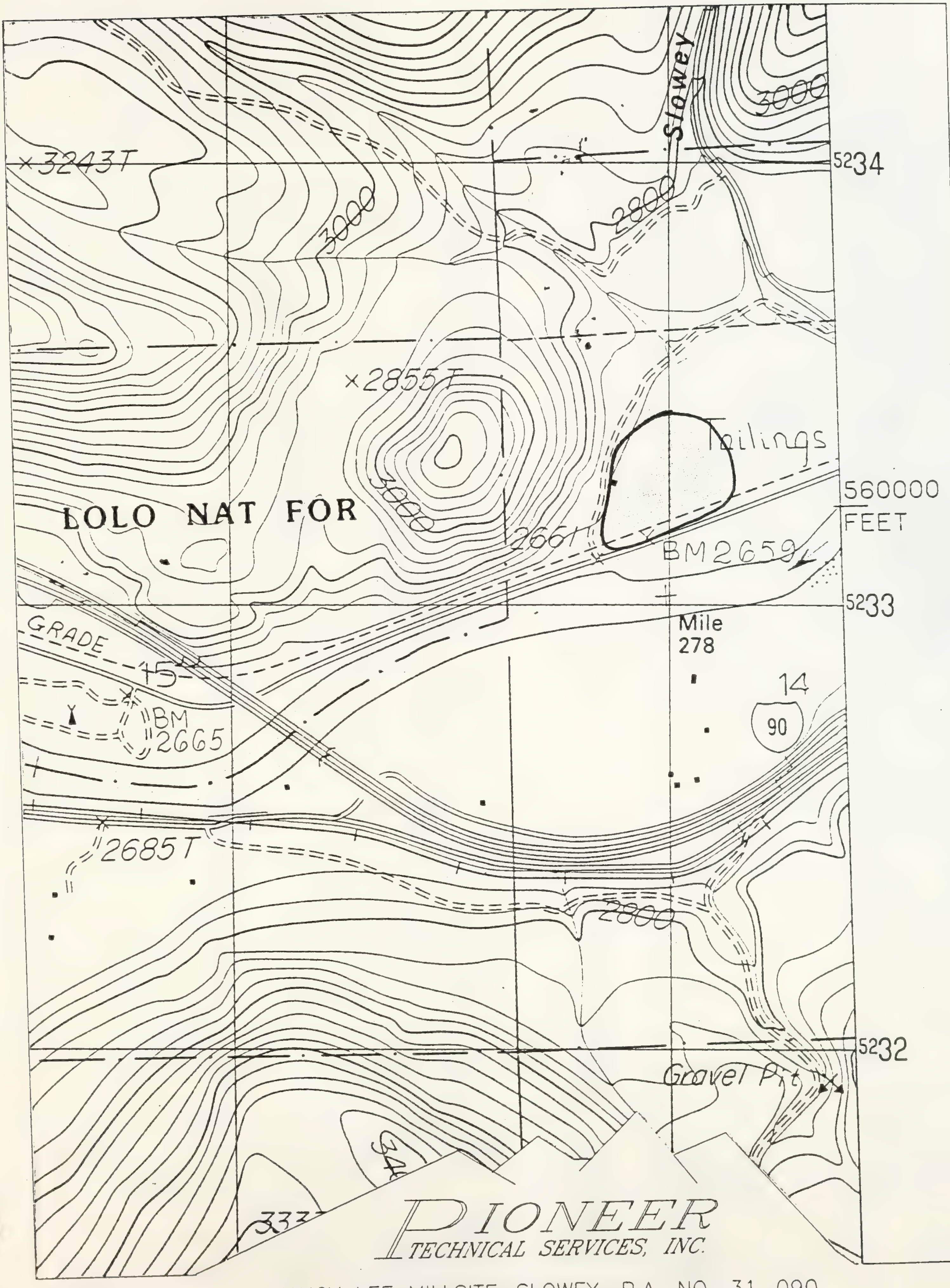
Period(s) of Operation: 1945 to 1973

Origin of Ore Milled - Custom Mill___ Dedicated Mill X ; Number and names of mines that supplied mill feed: Nancy Lee Mine, except towards the end of the operating period when some ore was brought in from the Nine Mile district in Missoula County.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Floatation and cyanide leach; reagents used included copper sulfate, cyrillic acid, lime, soda ash, and zinc sulfate.

Montana Bureau of Mines and Geology 11/15/1993
Water Well Log Data

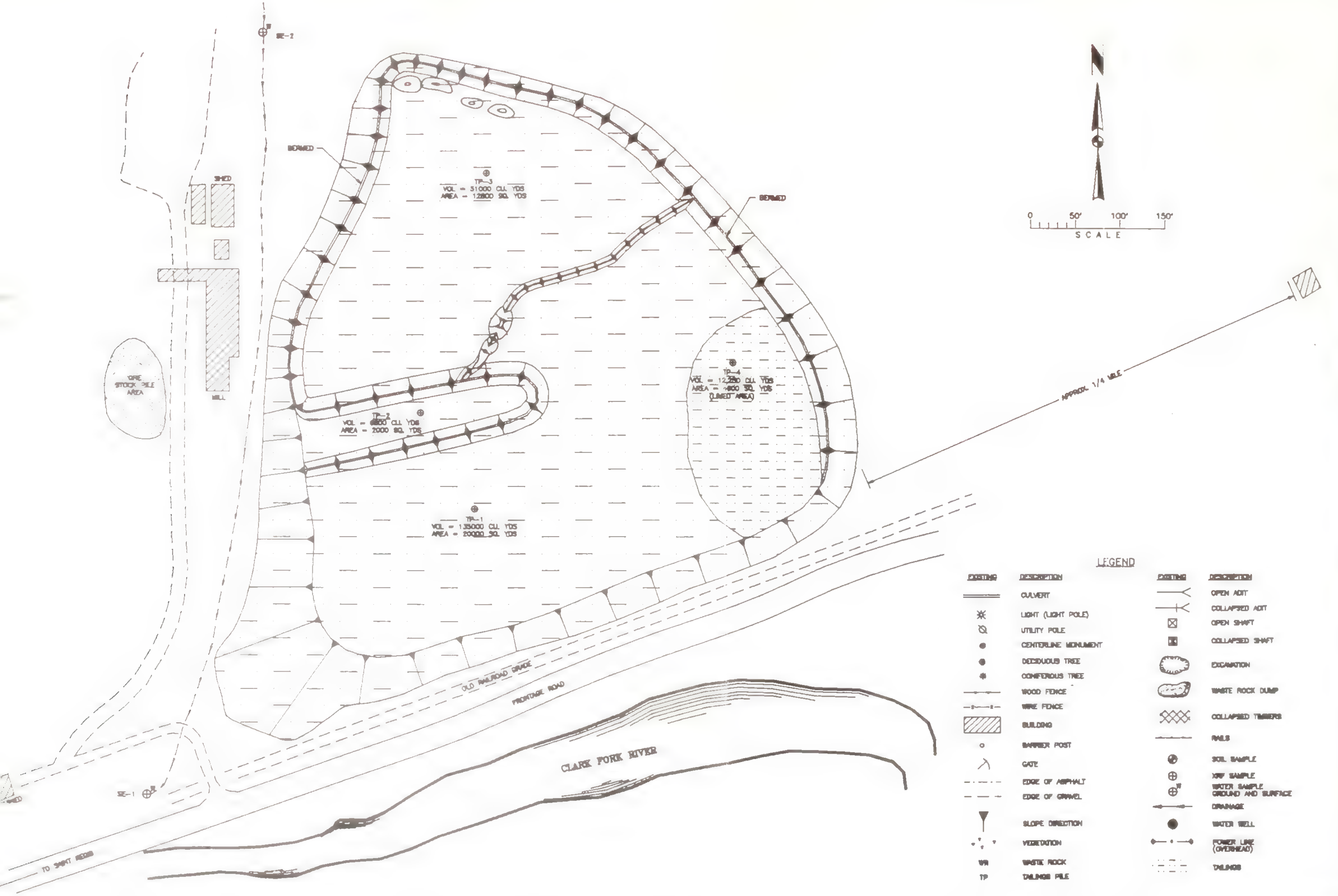
Well No.	Location	Depth	Yield	Static Water Level
M:126276	17N 27W 13	131.0	97.0	90.00
M:73215	17N 27W 13	101.0	50.0	60.00
M:73216	17N 27W 13	80.0	30.0	45.00
M:73217	17N 27W 13 ACB	107.0	15.0	52.00
M:73218	17N 27W 13 B	74.0	50.0	40.00
M:73219	17N 27W 13 DAB	80.0	50.0	47.00
M:121544	17N 27W 14	60.0	30.0	38.00
M:73220	17N 27W 14 BB	52.0	30.0	20.00
M:73221	17N 27W 14 BCCD	46.0	500.0	35.00
M:73222	17N 27W 15	85.0	8.0	50.00
M:73223	17N 27W 15	59.0	25.0	40.00
M:123240	17N 27W 15 BC	87.0	15.0	30.00
M:73224	17N 27W 15 CC	222.0	200.0	53.00
M:73225	17N 27W 15 CCA	204.0	15.0	Flowing
M:73226	17N 27W 15 CD	159.0	100.0	61.00
M:73227	17N 27W 15 DCCA	108.0	30.0	66.00
M:73230	17N 27W 23	174.0	30.0	140.00
M:73231	17N 27W 24	109.0	15.0	63.00
M:73232	17N 27W 24	243.0	15.0	218.00
M:73233	17N 27W 24 ACAD	80.0	100.0	50.00
M:73234	17N 27W 24 ACC	95.0	20.0	67.00
M:73235	17N 27W 24 CA	125.0	40.0	89.00
M:73236	17N 27W 24 DBC	110.0	10.0	0.00
M:73237	17N 27W 24 DBDC	177.0	20.0	147.00
73238	17N 27W 24 DCDA	121.0	50.0	90.00



PIONEER TECHNICAL SERVICES, INC.

NANCY LEE MILLSITE–SLOWEY, P.A. NO. 31–090

T17N, R27W, SECTION 14
SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NANCY LEE MILL SITE SLOWEY PA# 31-090
KEYSTONE DISTRICT MINERAL COUNTY

SHEET NO.

31-090.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Primarily fine sand

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Oxidized from surface to 6 to 8 feet; reduced below.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Small breaches on south end caused by concentrated runoff flow

Comments on potential for mitigation: Capping or amend and revegetate; potential to reprocess.

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	135,000	South central pond; 0-2', fine orange sand	Breached Impoundment	6.0 (D)	0.03	31-090-TP-1	09/08/93 2200	T-Metals, ABA
TP-1B	TAIL		2-4', fine orange sand	Breached Impoundment	4.1 (D)	0.03			
TP-1C	TAIL		4-9', dark brown fine sand	Breached Impoundment	4.0 (D)	0.03	31-090-TP-2	09/08/93 2200	T-Metals, ABA
TP-1D	TAIL		9-15', gray fine sand	Breached Impoundment	4.1 (D)	0.03			
TP-2A	TAIL	6,600	Western bermed area; 0-4', orange sand	Impoundment	6.2 (D)	0.035			
TP-2B	TAIL		4-8', orange sand	Impoundment	4.7 (D)	0.03			
TP-2C	TAIL		8-10', gray sand	Impoundment	< 3.5 (D)	0.03			
TP-2D	TAIL		10', underlying soil	Impoundment	4.0 (D)	0.04	N/A	N/A	XRF Analysis
TP-3A	TAIL	51,000	Northern area; 0-7', orange sand	Impoundment	5.5 (D)	0.02			
TP-3B	TAIL		7-10', tan sand	Impoundment	4.4 (D)	0.03			
TP-3C	TAIL		10-12', orange sand	Impoundment	3.8 (D)	0.025			
TP-4A	TAIL	12,250	Eastern lime area; 0-0.5', white powder lime	Breached Impoundment	NM	0.035			
TP-4B	TAIL		0.5-6', orange fine sand	Breached Impoundment	6.5 (D)	0.02			
TP-4C	TAIL		6-8', gray silt	Breached Impoundment	5.8 (D)	0.035			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-090-TP-1 is composite of TP-1A through -1C, TP-2A and -2B, TP-3A and -3B, and TP-4B. 31-090-TP-2 is composite of TP-1D, TP-2C, TP-3C, and TP-4C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 129

Distance to nearest well used for drinking? 1/4 mile upgradient to the east

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Precipitation infiltration may mobilize metals to the groundwater.

Other observations/notes: Downgradient cabin (200 yards west) did not have a well present. Water supply unknown.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Clark Fork River

Dry streambeds: Yes X, No ___, Name(s): Small unnamed intermittent drainage along the western edge of site

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): ___

Approximate Flood frequency? ___ 1 yr, ___ 10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)? ___
High Flow: 68,000, Average Flow: 11,000

Distance between waste source(s) and nearest surface water body (ft)?
Approx. 200 feet; no direct flow path to the river could be found.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Precipitation runoff flows through breached southern berm.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible drinking water, irrigation, stock watering, fishery, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): ___

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Intermittent drainage downgradient between tailings and cabin	N/A	N/A	N/A	N/A	N/A	N/A	31-090-SE-1	09/07/93 1730	T-Metals
SE-2	SE	Upgradient in intermittent drainage	N/A	N/A	N/A	N/A	N/A	N/A	31-090-SE-2	09/07/93 1600	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No samples were collected in the Clark Fork River because no direct flow path could be identified.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 40 acres

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 600 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	Low pH; ESD; Fe	Dry	180,000	180,000	Yes	High/Observed
TP-2	Low pH; ESD; Fe	Dry	18,000	18,000	Yes	Moderate
TP-3	Low pH; ESD; Fe	Dry	115,200	112,900	Yes	High
TP-4	Low pH; ESD; Fe	Dry	41,400	40,600	Yes	Moderate

Notes and Clarifications: TP-4 limed on surface. Blowing tailings observed while on-site.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:____

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes X , No___, Describe: Off-road vehicle tracks on the tailings

Accessibility - Fences, warning signs, closed roads? Fence with no gate or warning signs

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes X , No___, Comment Bald Eagle, Peregrine
Bat Habitat - Yes___, No X , Comment____

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium X , Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 2

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes X , No___, Number 4 , types and locations: Structures associated with the mill

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No X , Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

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MDSL/AMRB, Letter from Denise Molt, Mineral County Sanitarian, to Ed Gensler, October 12, 1990.

USGS, Geology and Mineral Deposits of the St. Regis-Superior Area, Mineral County, Montana, Bulletin 1082-L, Author Unknown, Date Unknown, pp. 590-593.

USGS, Topographic Map, Wilson Gulch, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

NANCY LEE MILLSITE - SLOWEY
PA NO. 31-090

Nancy Lee–Slowey PA# 31–090
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/07/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–090–SE–1	1010 J	379	13.8	15.8	4.8	435	30400	2.38 J	1620	7.21	3360	78.6 J	4240 J	NR
31–090–SE–2	31.4 J	93.6	0.4 U	3.66	4.11	590	14100	0.028 U	906	6.03	35.4	5.13 UJ	69.9 J	NR
31–090–TP–1	1490 J	6.21	9.3	24.9	2.9	316	178000	0.085 J	9940	1.99 U	1080	85.4 J	2180 J	NR
31–090–TP–2	3040 J	22.3	14.0	26.9	6.48	299	114000	1.06 J	7630	2.36	2320	123 J	3440 J	NR
BACKGROUND	7.89	8.8	0.5 U	3.31	1.2 U	2.44 J	3120	0.009 UJ	609	2.22 U	7.59 J	5.39 U	11.9	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–090–TP–1	0.66	20.6	9.15	–11.	<0.01	0.74	0.19	23.1	–14
31–090–TP–2	0.78	24.4	9.07	–15.	0.04	0.56	0.18	17.5	–8.42

LEGEND

SE1 – Intermittent drainage between tailings and cabin.
SE2 – Upgradient intermittent drainage.
TP1 – Composite of subsamples TP1A, 1B, 1C, 2A, 2B, 3A, 3B, and 3C
TP2 – Composite of subsamples TP1D, 2C, 3C, and 4C.
BACKGROUND – From the Nancy Lee (31–001–SS–1).

XRF ANALYSIS RESULTS

NANCY LEE MILLSITE - SLOWEY
PA NO. 31-090

Mine Name: Nancy Lee Mill – Slowey PA# 31–090
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31–090–TP1–A		6444.18	2135.34	473.036		16726.1	240681		282.035 *	171.012 *	2303.08	
31–090–TP1–B		5918.3	2442.87	611.141		14878.9	200325		190.949 *	193.391 *	3030.72	
31–090–TP1–C		10671	2079.09	764.538		4699.25	49771.5		350.873	2712.61	67.3521 *	10.5798 *
31–090–TP1–D		8959.38	3205.36	691.757		11305.2	125992		192.646 *	4306.78	1165.5	21.7946 *
31–090–TP2–A		4578.22	1980.58	347.302 *		14554.6	206605		219.559 *	1662.45	1321.67	
31–090–TP2–B	419.946 *	4868.18	1901.5	334.076 *		14277.8	227273		372.336	3367.09	2391.75	
31–090–TP2–C	366.267 *	38121	2247.07	1403.23		7365.06	101814		414.153	3029.45	2717.87	30.5737
31–090–TP2–D		20617.2	5164.03	1494.6		2181.31	34210.4		87.9155 *	613.02	238.85	194.712
31–090–TP3–A		4612.2	2138.13	341.413 *		17221.7	217979		196.085 *	2169.4	1089.46	
31–090–TP3–B		9994.31	1545.29	756.688		5770.84	56517.9		127.33 *	2068.13	237.712	7.06937 *
31–090–TP3–C		8439.65	2001.34	790.439	149.653 *	7029.67	82673.7		78.7024 *	2216.1	960.622	16.7981 *
31–090–TP4–A		23014.5	32754.1	1245.89		3203.31	36538.8		2283.84	175.773	99.0392 *	118.437
31–090–TP4–B		5950.8	3115.54	443.007		13081.3	203035		198.788 *	165.491 *	1628.12	
31–090–TP4–C		37222.7	2433.95	1058.06		7031.78	74048.1	437.203 *	236.48	5763.34	1219.29	43.5709
31–090–TP–1–COMP		6862.98	2294.14	494.944	141.888 *	13071.1	182212		346.173	1983.17	1354.05	
31–090–TP–2–COMP		22847.4	2449.03	1022.85		9143.71	114074		337.687	2525.2	3147.16	19.9414 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31–090–TP1–A	209.097		11.6861 *	1454.53			373.375	31.5109 *			
31–090–TP1–B	197.721		10.368 *	684.544	29.1156 *		271.152 *				
31–090–TP1–C	109.912			594.55	52.3812		129.957 *	172.042			
31–090–TP1–D	111.709	59.9587 *		2984.74	48.0029 *		235.533 *	177.837			10.1929 *
31–090–TP2–A	107.514		8.07439 *	771.354	24.367 *						
31–090–TP2–B	103.043	63.6096 *	6.48035 *	1393.75	19.8014 *	411.739 *	99.5492 *	63.0525 *			
31–090–TP2–C	159.092			1026.12	191.33			664.759	151.233 *		10.8849 *
31–090–TP2–D	266.57		5.13378 *	245.885	107.913			546.914			14.0774 *
31–090–TP3–A	89.4998	58.8941 *	10.2974 *	948.934		257.196 *					
31–090–TP3–B	143.184			523.507	39.9504 *			164.994			
31–090–TP3–C	105.814		6.04702 *	2093.3	50.3994 *		340.19	149.198			
31–090–TP4–A	185.627		9.98295 *	86.1253	137.115			517.148			7.18928 *
31–090–TP4–B	107.714			519.149	21.6305 *			39.3928 *			
31–090–TP4–C	147.834	63.2363 *		5266.55	193.908		886.853	476.503			
31–090–TP–1–COMP	138.774		6.90914 *	955.022	31.6914 *		169.473 *	93.6768 *			
31–090–TP–2–COMP	126.638	50.5481 *		1458.92	93.0147	357.042 *	90.5714 *	390.233			

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NANCY LEE MILLSITE-SLOWEY
PA NO. 31-090

AIMSS SCORESHEET

SITE NAME: NANCY LEE MILL- SLOWEY
PA NUMBER: 31-090

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	429.302
6	GW - TARGETS	WELLS - 1 MI. x 2.5		62.5
7		WELLS - 1 TO 4 MI		104
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	171.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	14725059

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	340
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	468.911
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2710306

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		200
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	400
27		LIKELIHOOD SCORE	LINES 25 + 26C	600
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.937
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	55
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	96921

DIRECT CONTACT PATHWAY

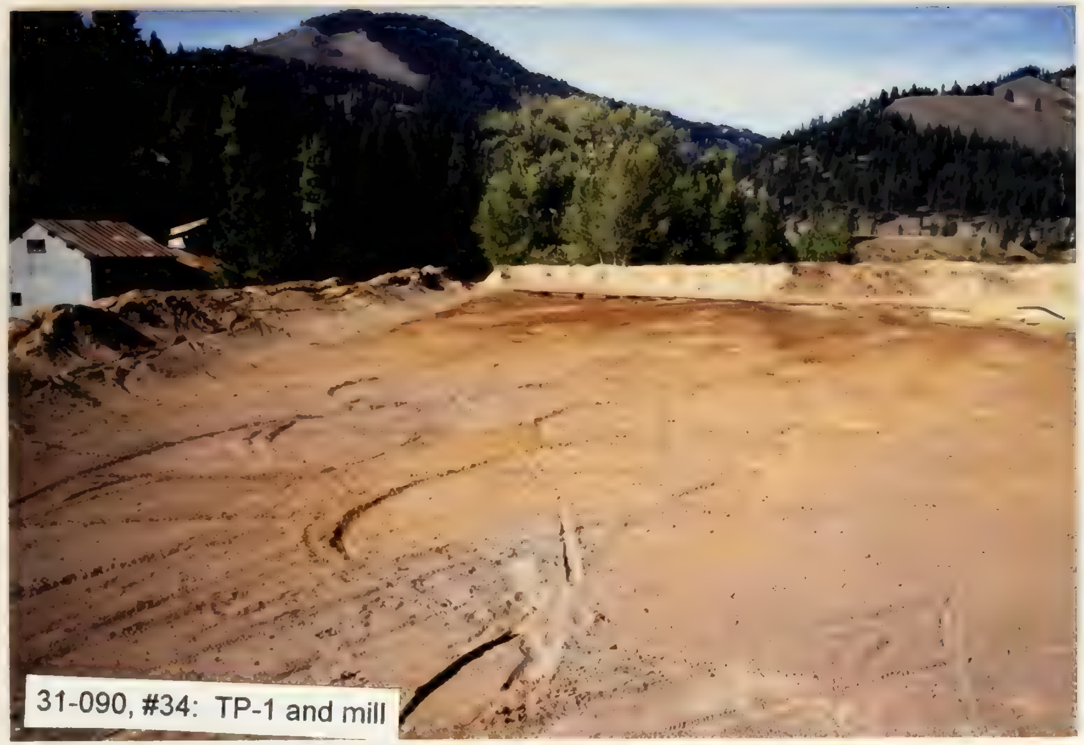
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.647
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	13
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	8603

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**175.41**

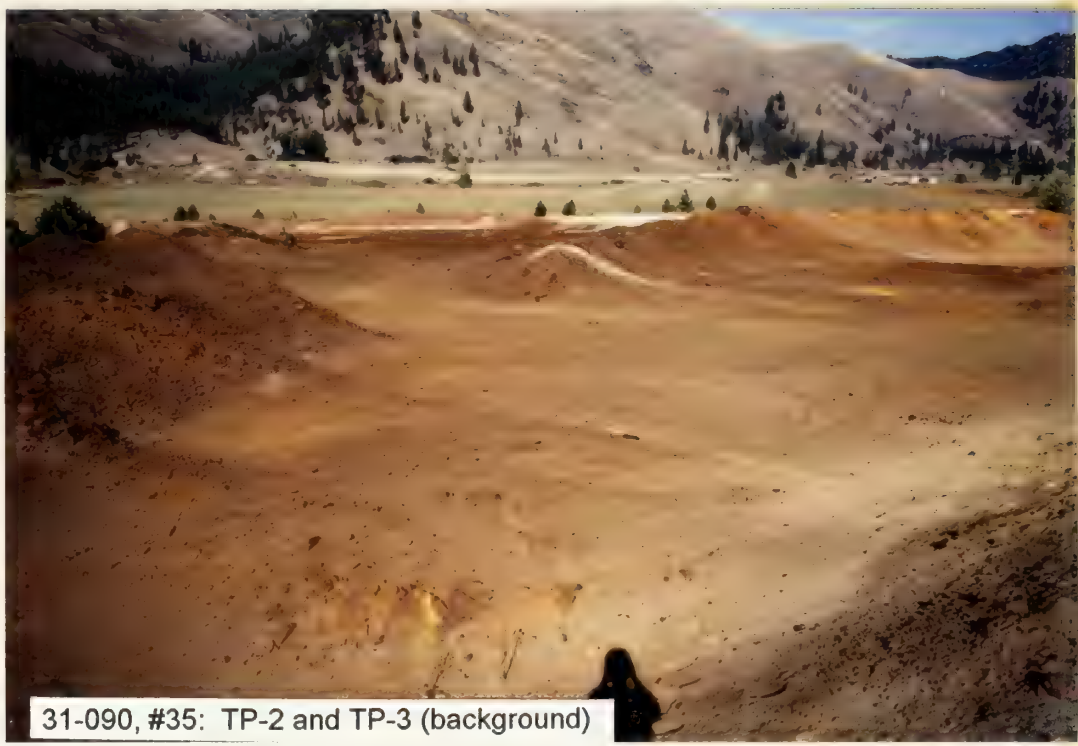
SITE NAME: NANCY LEE MILL- SLOWEY
PA NUMBER: 31-090

SITE SAFETY

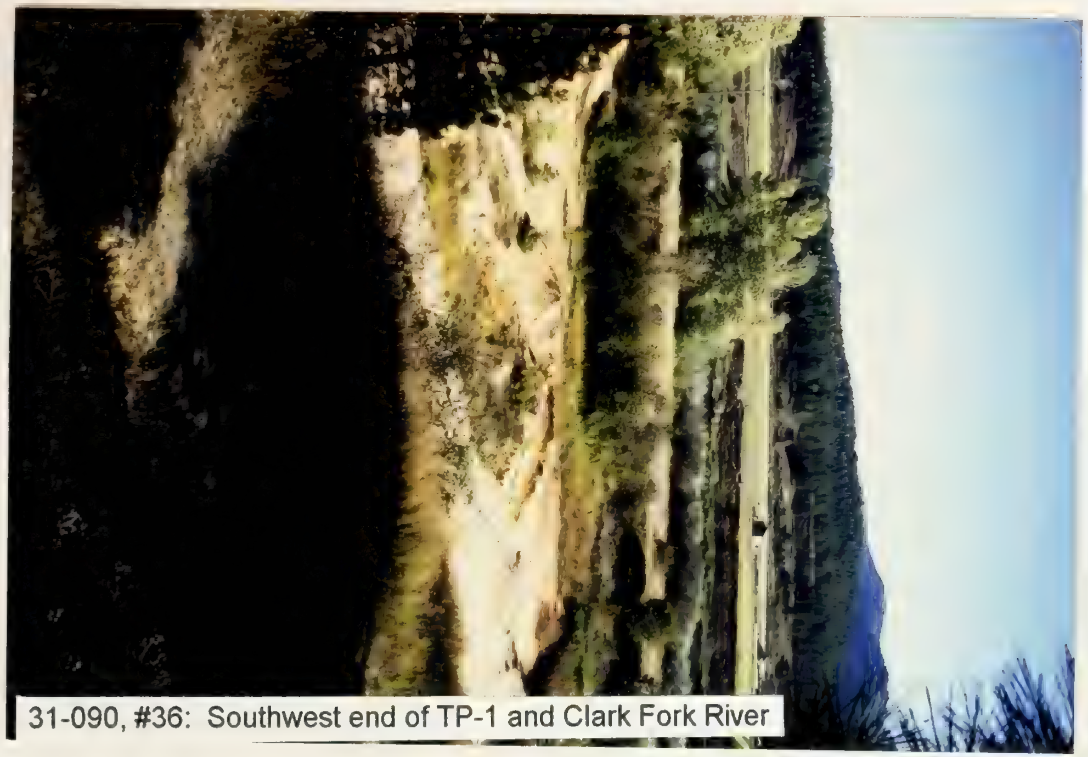
LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	260
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	13
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**33.80**



31-090, #34: TP-1 and mill



31-090, #35: TP-2 and TP-3 (background)



31-090, #36: Southwest end of TP-1 and Clark Fork River

PACKER CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: TARBOX-MINERAL KING **PA#:** 31-003

Date: August 2, 1993 **Time:** 0830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (75°F); sunny; calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #2: SW-1 and SE-1 sample locations downgradient of WR-1; #3: Adit #1 discharge, GW-1 sample location; #4: WR-2. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Site was accessed by truck, but there is a locked gate approx. 1.5 miles before the mine; the gate was unlocked during this investigation.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate WR-1 and WR-2 away from Packer Creek; amendments, and vegetate WR-1 and WR-2. Study water treatment requirements and alternatives.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): TARBOX-MINERAL KING PA#: 31-003

Legal Description: T 20N ;R 31W ;Sec. 35 , SE1/4 NE1/4 ___1/4

County: MINERAL Mining District: PACKER CREEK

Latitude: N 47° 27' 05" Longitude: W 115° 29' 55"

Primary Drainage Basin and Code: St. Regis River/17010204
Secondary Drainage Basin: Packer Creek

USGS Quadrangle map name(s): Haugan

Mine Type/Commodities: Hardrock/Lead, Zinc, Silver, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: Wabash and Meadow Mountain mines are of similar deposit types.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? The shaft has been fenced at one time, but the fence is down at present.

General site features: Elevation 4000', Slope 5°-10°, Aspect East

Land use: Mining X , Recreational___, Residential X , Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 2.5 acres.
Dimensions: 520 feet x 200 feet

Predominant vegetation types: Lodgepole pine, larch, hemlock, cottonwood, alder

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is located on an unnamed perennial tributary to the perennial Packer Creek. The confluence of the two tributaries is just below the site and both creeks flow south through the site. The site is underlain by quartzites and argillites of the Precambrian Wallace Formation.

Mining/milling history, ore type/tenor, host rock, gangue: Mine structures were burnt in 1910 and the workings were allowed to flood in December of 1922. Ore minerals are galena, sphalerite, pyrite, chalcopyrite, arsenopyrite, covellite, ankerite, and siderite in a gangue of quartz. Mineralization occurs in altered and crumpled argillites and quartzites of the Wallace Formation.

Mine Operation?

Shafts - Yes X, No ___, # 1, Comment Caved

Adits - Yes X, No ___, # 1, Comment Caved

Pits - Yes ___, No X, # ___, Comment

Placers - Yes ___, No X, # ___, Comment

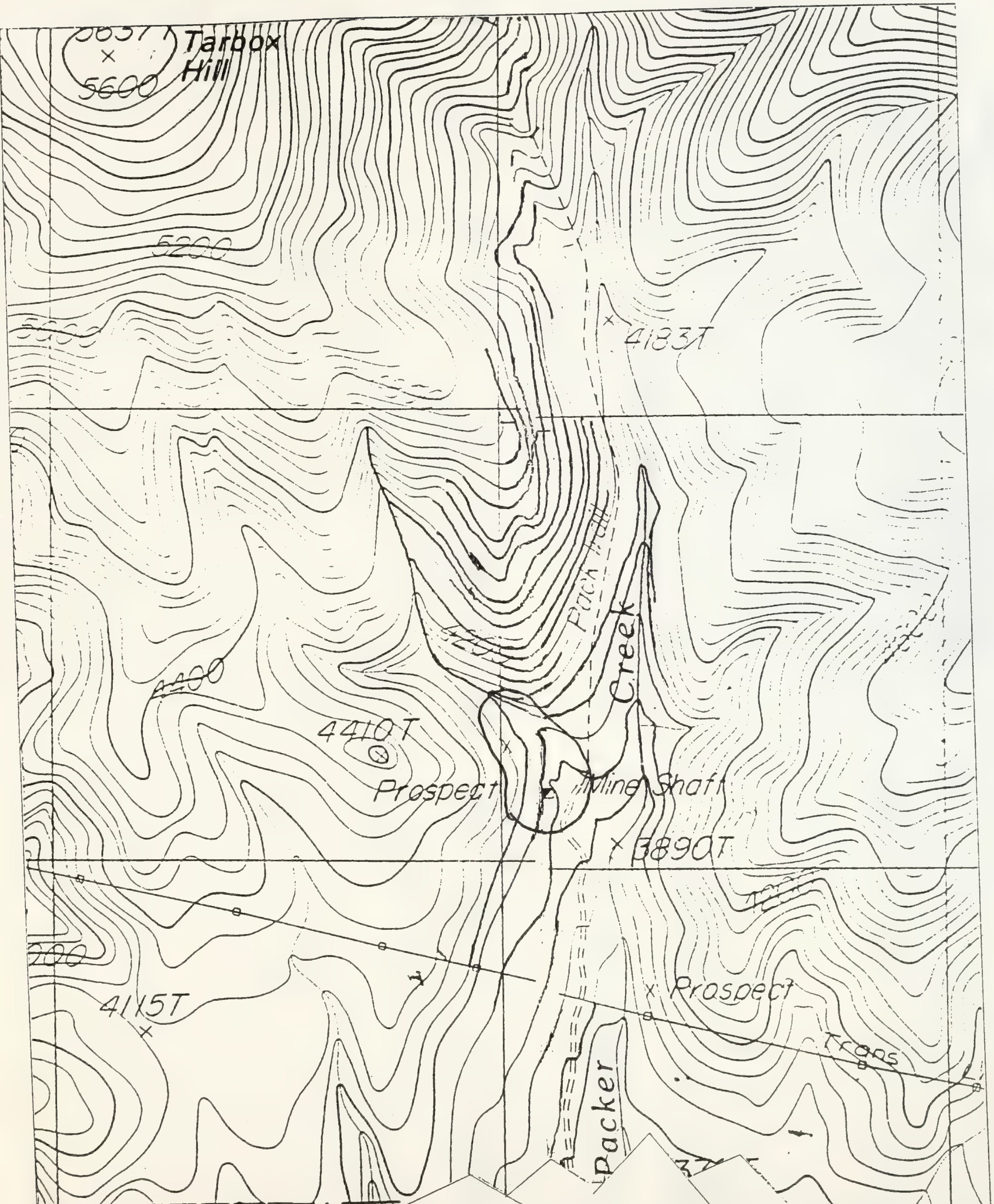
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

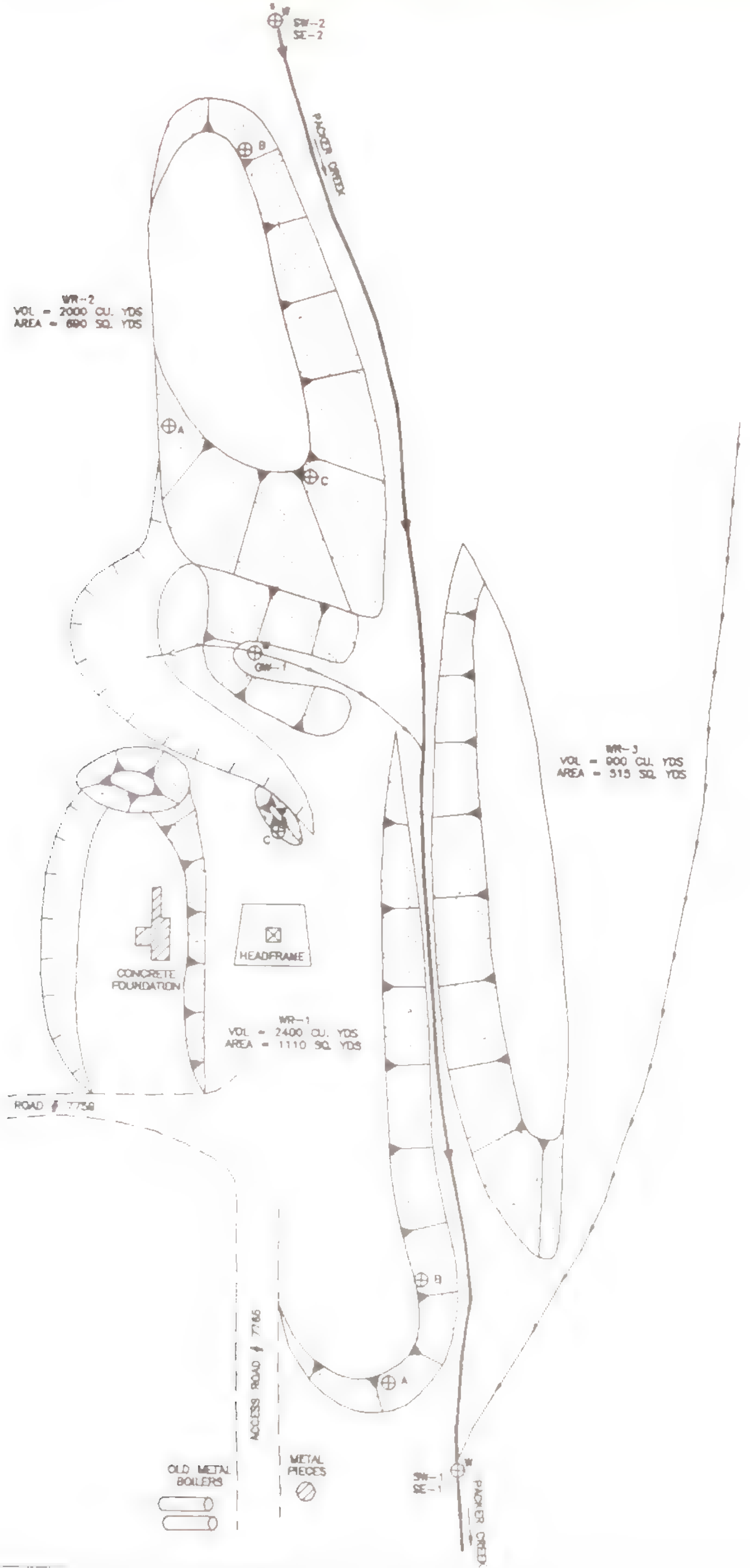
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

TARBOX–MINERAL KING, P.A. NO. 31–003

T20N, R31W, SECTION 35
SCALE: 1" = 1000'



NOT TO SCALE

LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═	CULVERT	—<	OPEN ADIT
☼	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⊘	UTILITY POLE	☒	OPEN SHAFT
●	CENTERLINE MONUMENT	■	COLLAPSED SHAFT
●	DECIDUOUS TREE	⬭	EXCAVATION
✱	CONIFEROUS TREE	⬭	WASTE ROCK DUMP
—•—	WOOD FENCE	⨯⨯⨯	COLLAPSED TIMBERS
-·—·-	WIRE FENCE	—	RAILS
▨	BUILDING	◕	SOIL SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⌒	GATE	⊕W	WATER SAMPLE GROUND AND SURFACE
—·—·—	EDGE OF ASPHALT	—►—	DRAINAGE
— — —	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	◆—•—◆	POWER LINE (OVERHEAD)
·˙·	VEGETATION	- - -	TAILINGS
WR	WASTE ROCK		
TP	TAILINGS PILE		

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

TARBOX–MINERAL KING PA# 31–003
PACKER CREEK DISTRICT MINERAL COUNTY

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TD&H

DRAWN WMC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

31–003.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,400	South end of WR-1 approximately 3 feet from top	None	5.6 (D)	0.04	31-003-WR-1	08/02/93 1830	T-Metals, ABA
WR-1B	WR		In gray dump just north of red dump, below flat area	None	6.8 (D)	0.04	31-003-WR-2	08/02/93 1830	T-Metals, ABA
WR-1C	WR		North of shaft on small waste rock pile approx. 100 feet from shaft, near top	None	6.6 (D)	0.05			
WR-2A	WR	2,000	North of adit on south end of WR-2	None	6.6 (D)	0.04			
WR-2B	WR		East end of WR-2 overlooking creek, 3 feet from top	None	6.8 (D)	0.06			
WR-2C	WR		South of WR-2B, south side of dump, approx. 75 feet east of adit	None	6.8 (D)	0.06			
WR-3	WR	900	Dump material formerly part of WR-1, divided by Packer Creek	None	N/A	N/A	N/A	N/A	N/A

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-003-WR-1 is a grab of WR-1A. 31-003-WR-2 is composite of WR-1B and -1C, and WR-2A through -2C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X , Number: ____ Identification: ________

Seeps/Springs: Yes X , No _____, Number: 1 Identification: Adit discharge seeps out of toe of WR-2; sampled as GW-1.

Groundwater wells within 4 miles?: Yes ___, No X ;
Number of well logs: 0

Distance to nearest well used for drinking? Possible drinking water wells 1.5 miles from site; no logs found.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Metal values in dumps are low; pH of water was good.

Other observations/notes: Aquatic life (frog) living in seep water; orange algae growing in seep.

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	At seep below Adit #1	5 gpm (E)	6.39	140	165	14.7	30	N/A	31-003-GW-1	08/02/93 1045	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Unnamed tributary of Packer Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Seep from Adit #1 to stream

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Toes of both WR-1 and WR-2

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 2.5 cfs , Average Flow: 0.25 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; WR-1 and WR-2 are in contact with the unnamed tributary.

Surface water draining onto or through waste sources: Yes X , No ____, Describe: Water from Adit #1 drains through part of WR-2 and reappears as seep (GW-1 sample location).

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible residential use, wetlands, agriculture, fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 50+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Heavy iron-staining of rocks in the creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient of WR-1 approx. 30 feet below lower shaft dump	7.17	90	103	10.2	19	0.24 cfs (M)	31-003-SW-1	08/02/93 1015	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient of WR-1 approx. 30 feet below lower shaft dump	N/A	N/A	N/A	N/A	N/A	N/A	31-003-SE-1	08/02/93 1015	T-Metals
SW-2	SW	Upgradient of WR-2 on south fork of creek	7.80	50	164	10.2	16	0.132 cfs (M)	31-003-SW-2	08/02/93 1115	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient of WR-2 on south fork of creek	N/A	N/A	N/A	N/A	N/A	N/A	31-003-SE-2	08/02/93 1115	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Mine site area approximately [illegible] acres

Wetlands present: Yes X , No ___, **Describe:** Small wetlands present where adit seep emerges and flows to creek.

Carbonate rocks/soils: Yes X , No ___, **Describe:** Gangue and ore minerals are reported in literature to be carbonaceous; Wallace Formation in the area.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments ___

Nearest residence(ft or miles)? 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	Iron-staining; pH	Dry	10,000	6,000	No	None
WR-2	Stressed vegetation	Partial	6,200	1,550	No	None
WR-3	Iron-staining	Dry	4,600	2,800	No	None
Adit #1	Algae	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:_______

Accessibility - Fences, warning signs, closed roads? Two gates, both unlocked, between main road and the site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Headframe of Shaft #1

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_,
types and locations: Highwall behind Adit #1 (falling rock)

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_2_, types and locations: WR-1 and WR-2 on side bordering creek are very steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

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USGS, Contributions to Economic Geology, Reconnaissance Geology, Western Mineral County, Montana, Bulletin 1027-M, Author Unknown, Date Unknown, pp. 604-605.

USGS, Topographic Map, Haugan, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

TARBOX-MINERAL KING
PA NO. 31-003

Tarbox–Mineral King PA# 31–003
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–003–SE–1	1210	45.1	1.7	5.61	2.9	42.6 J	87000	0.009 UJ	9650	2.1 U	3060 J	5.08 U	2440	NR
31–003–SE–2	17.3	31.9	0.6 U	3.43	1.47 U	8.12 J	21800	0.009 UJ	711	7.99	37.9 J	6.61 U	55.4	NR
31–003–WR–1	4030	33.4	45.8	6.57	3.34	209 J	142000	0.308 J	6570	2.59 U	10100 J	279	26400	NR
31–003–WR–2	244	26.9	1.1	6.53	2.55	18 J	18700	0.071 J	1180	8.63	158 J	4.16 U	443	NR
BACKGROUND	4.52 U	241 J	0.5 U	6.09 J	4.83	16.2 J	12500	0.047 J	1020 J	9.02	22.2 J	5.89 U	59.3 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–003–WR–1	3.14	98.1	3.19	–94.9	0.01	0.83	2.30	25.9	–22.7
31–003–WR–2	0.14	4.37	14.2	9.82	0.01	0.04	0.09	1.25	12.9

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31–003–GW–1	1.69 U	16.2	2.57 U	9.7 U	6.83 U	1.55 U	594	0.038 U	793	13.5	1.97	30.7 U	307	57.5
31–003–SW–1	3.46	8.9	2.57 U	9.7 U	6.83 U	1.55 U	378	0.039 J	178	14.4	2.85	30.7 U	256	27.2
31–003–SW–2	1.69 U	6.37	2.57 U	9.7 U	6.83 U	1.55 U	53.4	0.049 J	5.6	12.7 U	1.86	30.7 U	7.57 U	11.5

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
31–003–GW–1	99	< 5.0	22	< 0.05	NR
31–003–SW–1	55	5.7	8	< 0.05	NR
31–003–SW–2	43	5.7	< 5	< 0.05	NR

LEGEND

SE1 – Downgradient of waste rock dump 1, approx. 30' below lower shaft dump.
SE2 – Upgradient of waste rock dump 2 on South Fork of Creek.
WR1 – Sample of the WR1A subsample.
WR2 – Composite of subsamples WR1B, 1C, 2A, 2B, and 2C.
BACKGROUND – From the Saltese Consolidate (31–021–SS–1).
GW1 – At seep below adit #1.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

TARBOX-MINERAL KING
PA NO. 31-003

Mine Name: Tarbox – Mineral King PA# 31–003
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31–003–WR1–A		31937.8	1480.6	1114.68		3064.83	86800.1		96.0984 *	9938.8	3815.59	22.131 *
31–003–WR1–B		39033.9	7692.94	1290.73		1854.91	22007.7	228.482 *	40.7784 *	189.305	218.007	38.1452
31–003–WR1–C		34816.1	1904.76	1448.54		3152.4	29159.1		75.3851 *	869.609	499.532	20.4425
31–003–WR2–A		25633.7	2859.47	1786.46		2380.81	24903.8			505.086	206.332	57.9158
31–003–WR2–B		38545.6	4716.54	1170.06	192.907 *	1325.81	25109.4		41.6934 *	421.645	311.618	33.4851
31–003–WR2–C		36327.4	2669.36	1373.87		1900.64	26464.8	565.992 *	41.4653 *	605.798	409.651	24.2639
31–003–WR–1–COMP		36237.4	4426.88	1469.39		1793.12	26858.7	253.713 *	46.6604 *	498.212	378.777	36.0125

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31–003–WR1–A	206.435		8.49753 *	4249.65	194.144		501.131	179.836			17.2437 *
31–003–WR1–B	282.91		11.7083 *		220.42			235.71			27.4229
31–003–WR1–C	318.829		9.87999 *	171.75	227.599			268.859			21.3055 *
31–003–WR2–A	364.689		9.68543 *	180.28	162.238			290.237			20.534 *
31–003–WR2–B	311.124		5.76239 *	152.073	254.29			280.263			20.9683 *
31–003–WR2–C	263.653		7.3291 *	147.555	231.83			274.962			22.4
31–003–WR–1–COMP	302.366			137.766	240.714			307.469		12.0424 *	23.7542

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

TARBOX-MINERAL KING
PA NO. 31-003

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: TARBOX-MINERAL KING
PA NUMBER: 31-003

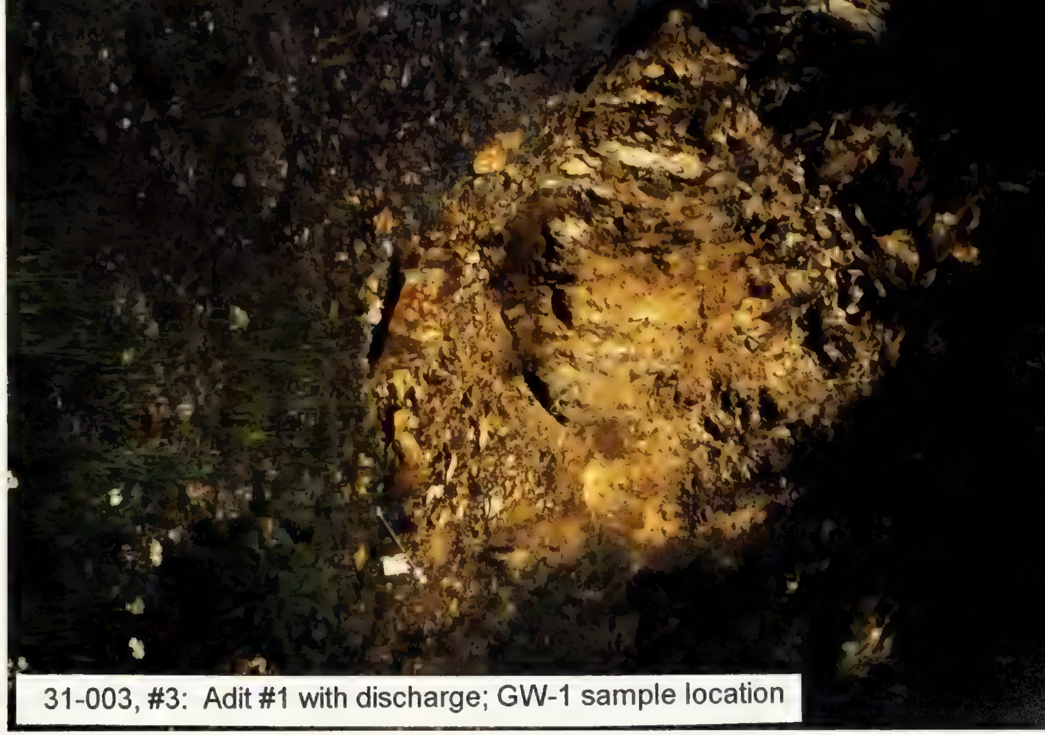
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.663
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.077
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	100271
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.160
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	8
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.148
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**1.00**

SITE NAME: TARBOX-MINERAL KING

PA NUMBER: 31-003

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	115
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

31-003, #2: SW-1 and SE-1 sample location 30' below lower shaft dump



31-003, #3: Adit #1 with discharge; GW-1 sample location

31-003, #4: WR-2

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: SALTESE CONSOLIDATE PA#: 31-021

Date: August 2, 1993 Time: 1200

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (80°F); sunny; calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #6: SW-1 and SE-1 location, facing north; #7: WR-2 and collapsed adit with wood below lower road; #9: WR-1; #10: Adit #1, GW-1 sample location.
Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms):
Site accessed by truck.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Study water treatment requirements; minimal measures will be necessary. Grade, amend, and revegetate dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SALTESE CONSOLIDATE PA#: 31-021

Legal Description: T 19N ;R 30W ;Sec. 4 ,SE 1/4 NW1/4 ___1/4

County: MINERAL Mining District: PACKER CREEK

Latitude: N 47° 26' 10" Longitude: W 115° 25' 40"

Primary Drainage Basin and Code: St. Regis River/17010204
Secondary Drainage Basin: Timber Creek

USGS Quadrangle map name(s): Haugan

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Lolo National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4200', Slope 3°,
Aspect South

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify) Transmission line nearby

Area of disturbed/unvegetated lands? 0.2 acres.
Dimensions: 150 feet x 150 feet

Predominant vegetation types: Cedar, roses, arrowroot

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). In the general area of Tarbox-Mineral King

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Discharge from Adit #1 is the beginning of a small stream; water flows south away from the site. It is unknown if it reaches a confluence with perennial East Fork Timber Creek on the surface approx. 1.5 miles below. The site is underlain by shales and sandstone, possibly Precambrian.

Mining/milling history, ore type/tenor, host rock, gangue: No information available

Mine Operation?

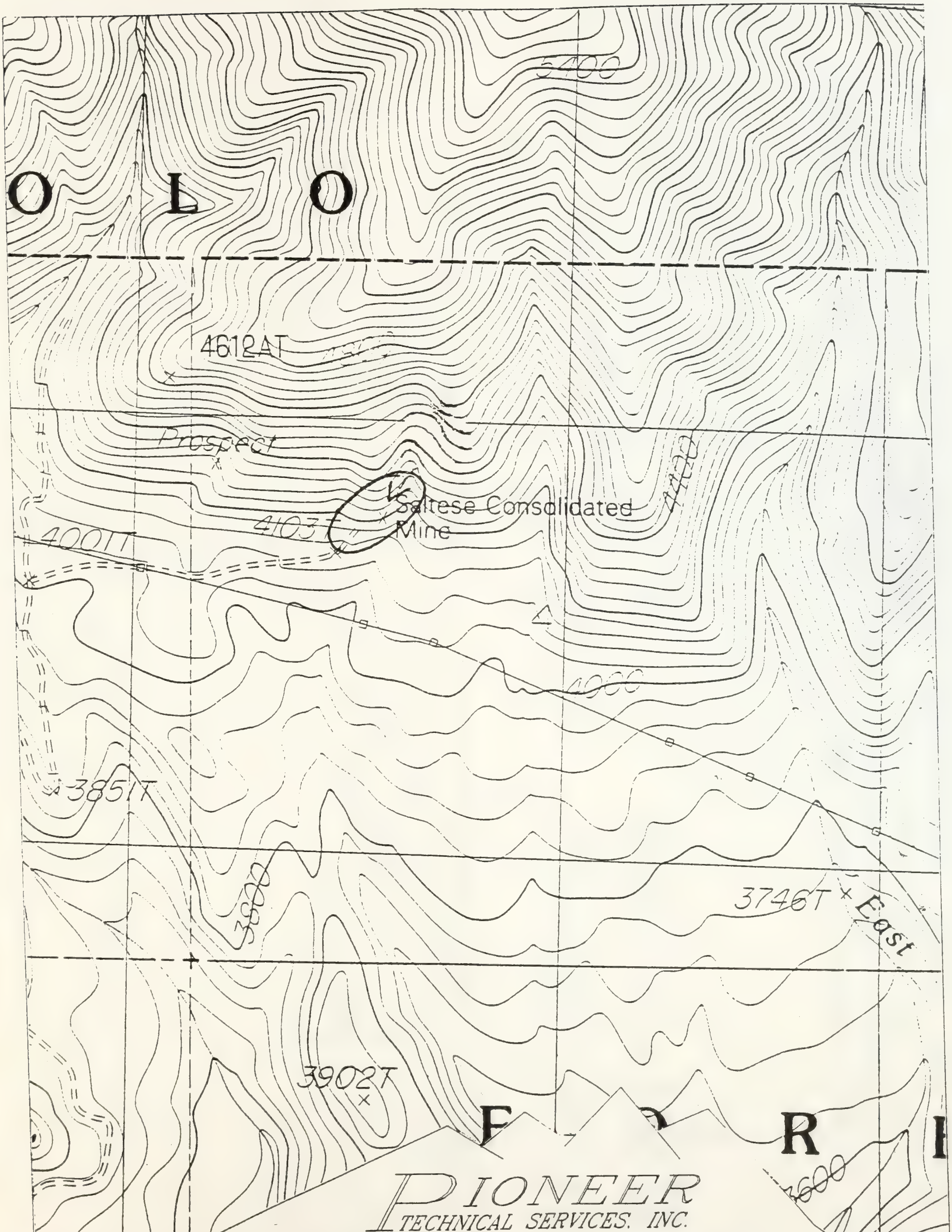
Shafts - Yes___, No X , # ____, Comment
Adits - Yes X , No___, # 3 , Comment All caved
Pits - Yes___, No X , # ____, Comment
Placers - Yes___, No X , # ____, Comment
Other - Yes___, No X , # ____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? N/A

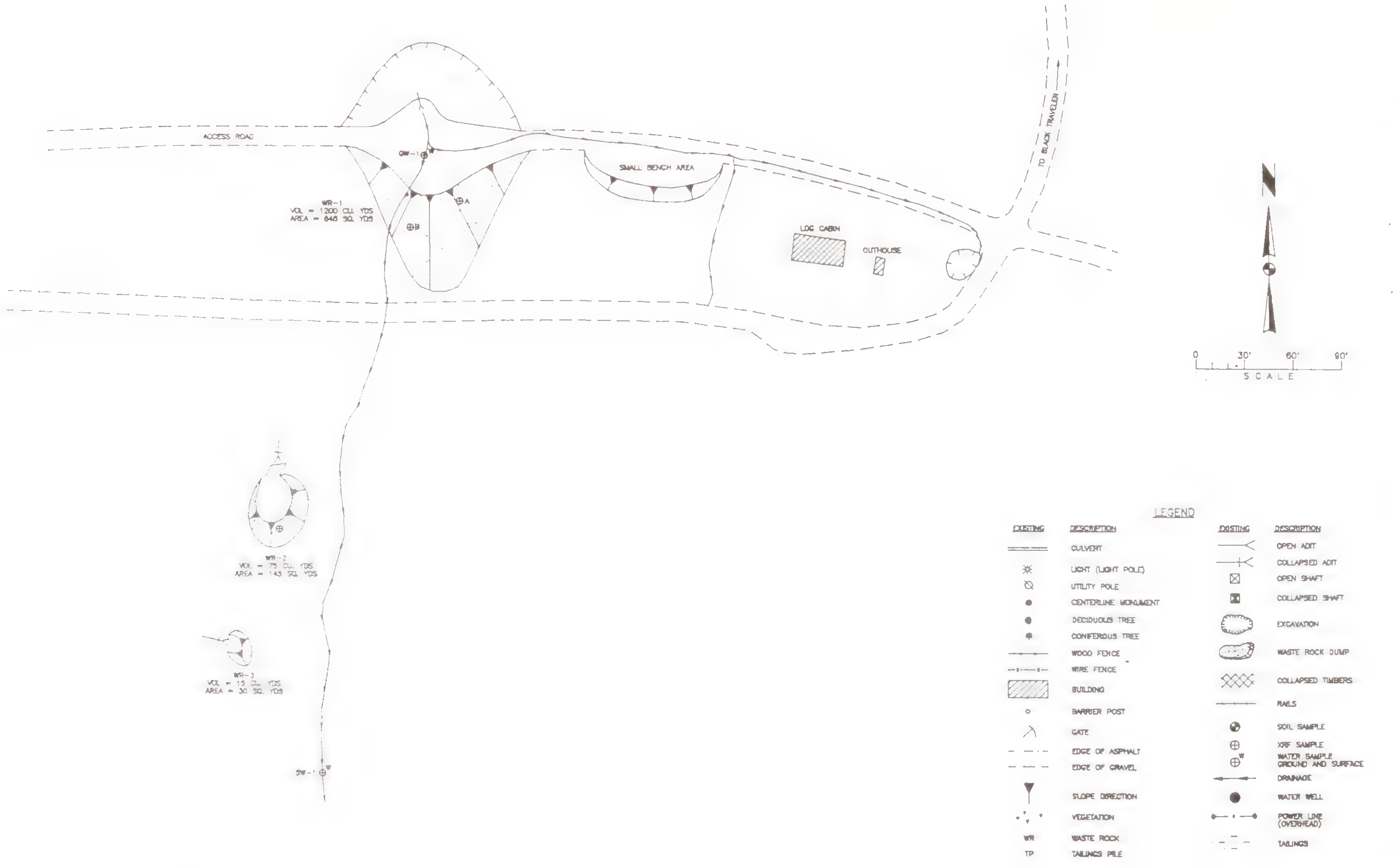


PIONEER
TECHNICAL SERVICES, INC.

SALTESTE CONSOLIDATE, P.A. NO. 31-021

T19N, R30W, SECTION 04

SCALE: 1" = 1000'



DRAWN WWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SALTESTE CONSOLIDATE PA# 31-021
PACKER CREEK DISTRICT MINERAL COUNTY

SHEET NO.

31-021.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,200	North side of dump associated with Adit #1	None	7.0 (D)	0.06	31-021-WR-1	08/02/93 1840	T-Metals, ABA
WR-1B	WR		South side of dump near adit discharge	None	7.0 (D)	0.05			
WR-2	WR	75	Near top of dump south of collapsed Adit #2	None	5.5 (D)	0.03			
WR-3	WR	15	Small dump south of WR-2	None	N/A	N/A	N/A	N/A	N/A
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	31-021-SS-1	08/02/93 1330	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 31-021-WR-1 is composite of WR-1A, -1B, and WR-2.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 87

Distance to nearest well used for drinking? Approx. 1.25 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Metal content in dumps are low; water flowing from adit does not appear to be impacted.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Approx. 10 feet from mouth of Adit #1 where it appears out of vegetation	0.11 cfs (M)	7.47	80	161.3	7.9	22	N/A	31-021-GW-1	08/02/93 1330	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No___, Name(s)/Description: Flow from Adit #1 appears to be the source of an unnamed tributary to the East Fork Timber Creek.

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-1 and WR-2

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 0.15 cfs , Average Flow: 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Flow from Adit #1 flows along edge of WR-1 and -2.

Surface water draining onto or through waste sources: Yes X , No____, Describe: See above

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Wetlands, fishery, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Approx. 50 feet downgradient of lower adit	8.60	110	205.4	9.1	29	0.105 cfs (M)	31-021-SW-1	08/02/93 1310	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 0.5 acre below WR-2; possibly 0.01 acre by Adit #1 discharge

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1.25 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Partial	5,800	2,900	Yes	Low
WR-2	None	Dry	1,300	1,240	Yes	Low
WR-3	None	Dry	270	0	No	None
Adit #1	Moss	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes ____, No X ,
Describe: ____

Population within 1 mile: 1-10 ___; 10-30 ___; 30-100 ___; 100-300 ___;
300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___;
Comments None

Evidence of recreational use on site: Yes ___, No X , Describe: ____

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes ___, No X , Comment ____
Wilderness Area - Yes ___, No X , Comment ____
T&E Species Habitat - Yes ___, No X , Comment ____
Bat Habitat - Yes ___, No X , Comment ____

Primary Drainage ___; Secondary Drainage X ; No Information ___:

Riparian Habitat Quality - High ___, Medium X , Low ___
Wetlands Frontage - High ___, Medium X , Low ___
Fisheries Habitat and Species Classification - 2
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes ___, No X , Number ____, types and locations: ____

Hazardous structures: Yes X , No ___, Number 1 , types and locations:
Cabin located east of site is falling down.

Unstable highwalls, pits, trenches, slopes: Yes X , No ___, Number 1 ,
types and locations: Highwall behind Adit #1

Unstable waste piles, impoundments, undercut banks: Yes ____, No X ,
Number ____, types and locations: ____

Fire and/or Explosion hazards: Yes ___, No X , Explain: ____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Saltese Consolidate, Prepared by Northern Engineering and Testing, June 4, 1988.

USGS, Topographic Map, Haugan, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

SALTESE CONSOLIDATE
PA NO. 31-021

MDSL AMRB/PIONEER 4/9/93

Salteste Consolidate PA# 31–021
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
31–021–WR–1	4.17 U	41	0.5 U	2.2	1.31	12.8 J	5740	0.228 J	255	4.27	29.7 J	5.42 U	39.3	NR
BACKGROUND	4.52 U	241	0.5 U	6.09	4.83	16.2 J	12500	0.047 J	1020	9.02	22.2 J	5.89 U	59.3	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
31–021–WR–1	<0.01	0.00	3.14	3.14	<0.01	<0.01	<0.01	0.00	3.14

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
31–021–GW–1	1.69 U	2.83	2.57 U	9.7 U	7.2	1.55 U	18.6	0.052 J	4.08 U	12.7 U	3.07	30.7 U	7.57 U	23
31–021–SW–1	1.69 U	16.5	2.57 U	9.7 U	6.83 U	1.55 U	65	0.056 J	11.2	12.7 U	1.55 U	30.7 U	7.57 U	21.5

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
31–021–GW–1	48	6.2	< 5.0	< 0.05	NR
31–021–SW–1	56	5.2	< 5.0	< 0.05	NR

LEGEND

WR1 – Composite of subsamples WR1A, 1B, and 2.
BACKGROUND – From the Salteste Consolidate Mine (31–021–SS–1).
GW1 – Approx. 10' from the mouth of adit #1 where it appears out of a vegetated area.
SW1 – Approx. 50' below lower adit – downgradient.

XRF ANALYSIS RESULTS

SALTESE CONSOLIDATE
PA NO. 31-021

Mine Name: Salteste Consolidate PA# 31-021
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
31-021-SS-1		14837.8	6963.29	2718.15		1488.71	21122.8			128.39 *		115.485
31-021-WR1-A		22614.9	1443.77	1697.67		261.444 *	14806.1			38.1532 *		30.7162
31-021-WR1-B		26404.8	2212.78	1622.99	172.743 *	679.766 *	14872.8					20.4712
31-021-WR2-A		40947.5	2469.05	2677.77		558.056 *	20074.5			62.9834 *	25.4256 *	42.8429
31-021-WR-1-COMP		26076.1	2152.29	1706.06		500.461 *	17534			46.287 *		29.2263

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
31-021-SS-1	292.92				135.357			397.398			21.3605
31-021-WR1-A	349.166		5.97654 *		129.791			387.171			24.1088
31-021-WR1-B	366.969				164.023			275.218			23.1576
31-021-WR2-A	395.646				213.762			621.013			29.0274
31-021-WR-1-COMP	468.982				168.182			430.588		11.4311 *	23.1112

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SALTESE CONSOLIDATE
PA NO. 31-021

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: SALTESE CONSOLIDATE
PA NUMBER: 31-021

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.708
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		87
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	87.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	29719
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.809
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		10
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	20
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	14472
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.44**

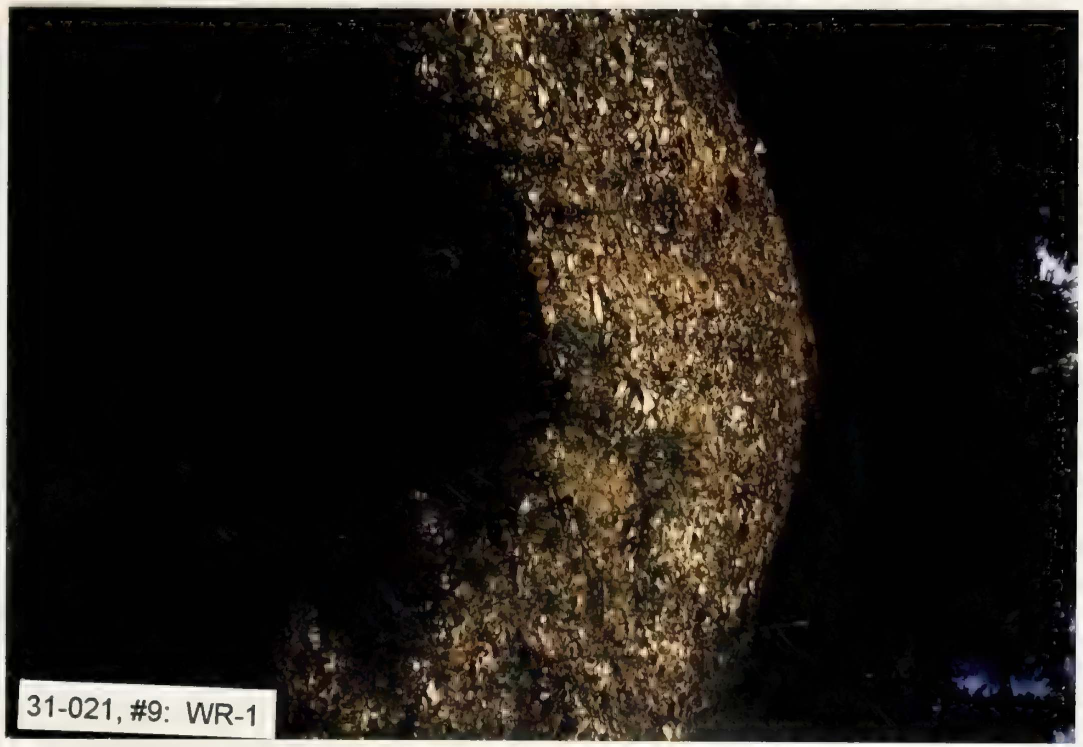
SITE NAME: SALTESE CONSOLIDATE
PA NUMBER: 31-021

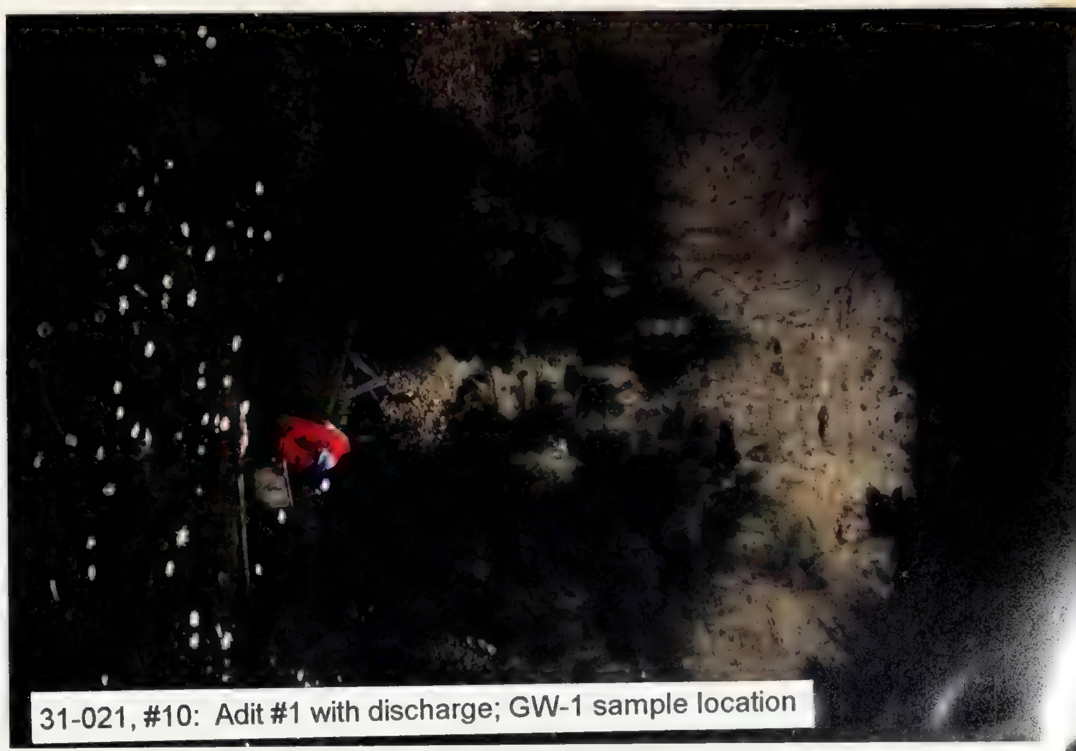
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4		UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	115
9	TARGETS	POPULATION - 1 MILE		0
10		NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

31-021, #6: SW-1 and SE-1 sample location, facing north downgradient

31-021, #7: WR-2 collapsed adit with wood below lower road


31-021, #9: WR-1


31-021, #10: Adit #1 with discharge; GW-1 sample location

MISSOULA

CRAMER CREEK

ELK CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LINTON MINE AND MILLSITE **PA#:** 32-017

Date: July 1, 1993 **Time:** 0830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; 70°F; slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #1,#2: Four openings of Adit #1, facing north; #3: WR-1, facing west, WR-1B in foreground; #4: Lower openings, Adit #2 (appears to be connected to Adit #1); #5: Loadout east of openings, gray material sampled as unknown (XRF), WR-2B was sampled just below loadout; #6: SW-2 sample location; #7: TP-1 and bank cut; #8: TP-1B; #9: Grizzly; #10: Placer and residence. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Site is on two levels: Adits and most waste rock is approx. 1000 feet above the millsite and tailings location. Road to upper area of site has a locked gate and is accessed by an old jeep trail (foot only) which starts above the millsite area. Access to lower area was by truck on Cramer Creek Road.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grade waste pile back away from active stream; amend, and revegetate waste materials. Close HMO's.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LINTON MINE AND MILLSITE PA#: 32-017

Legal Description: T 12N ;R 15W ;Sec. 30 , NW 1/4 SW 1/4 ___ 1/4

County: MISSOULA Mining District: CRAMER CREEK

Latitude: N 46° 46' 30" Longitude: W 113° 32' 36"

Primary Drainage Basin and Code: Clark Fork River/17010201
Secondary Drainage Basin: Cramer Creek

USGS Quadrangle map name(s): Mineral Ridge

Mine Type/Commodities: Hardrock/Lead, Silver

Activity Status: Active ___ ,Inactive/Exploration ___ ,Abandoned X .

Ownership status: Known Y X N ___ ; private/public? Public
Owner, Agent, or Contact (Include address and phone when available): BLM, P.O. Box 36800, Billings, MT 59107. (406) 255-2885.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Barbed wire around openings (in poor condition).

General site features: Elevation 4200'-4300', Slope 38°-level ,
Aspect Adits are southeast; millsite is south; tailings are west

Land use: Mining ___ , Recreational X , Residential X , Urban ___ ,
Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? 4.7 acres.
Dimensions: Upper site dimensions are 425 feet x 275 feet; lower site dimensions are 425 feet x 200 feet.

Predominant vegetation types: Douglas fir, Ponderosa pine, cottonwood, juniper, ninebark; knapweed and sweet clover on dump.

Access: roads - good X ,poor ___ ,4wd ___ ,trail ___ .
Other logistical considerations (proximity to other sites). Gate locked on road to upper site; foot trail above millsite.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the north side of perennial Cramer Creek. Water from the site flows south into creek, which flows west past the site. The site is underlain by limestone.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment

Adits - Yes X , No___, # 7 , Comment

Pits - Yes___, No X , # ____, Comment

Placers - Yes___, No X , # ____, Comment

Other - Yes X , No___, # 1 , Comment Cut

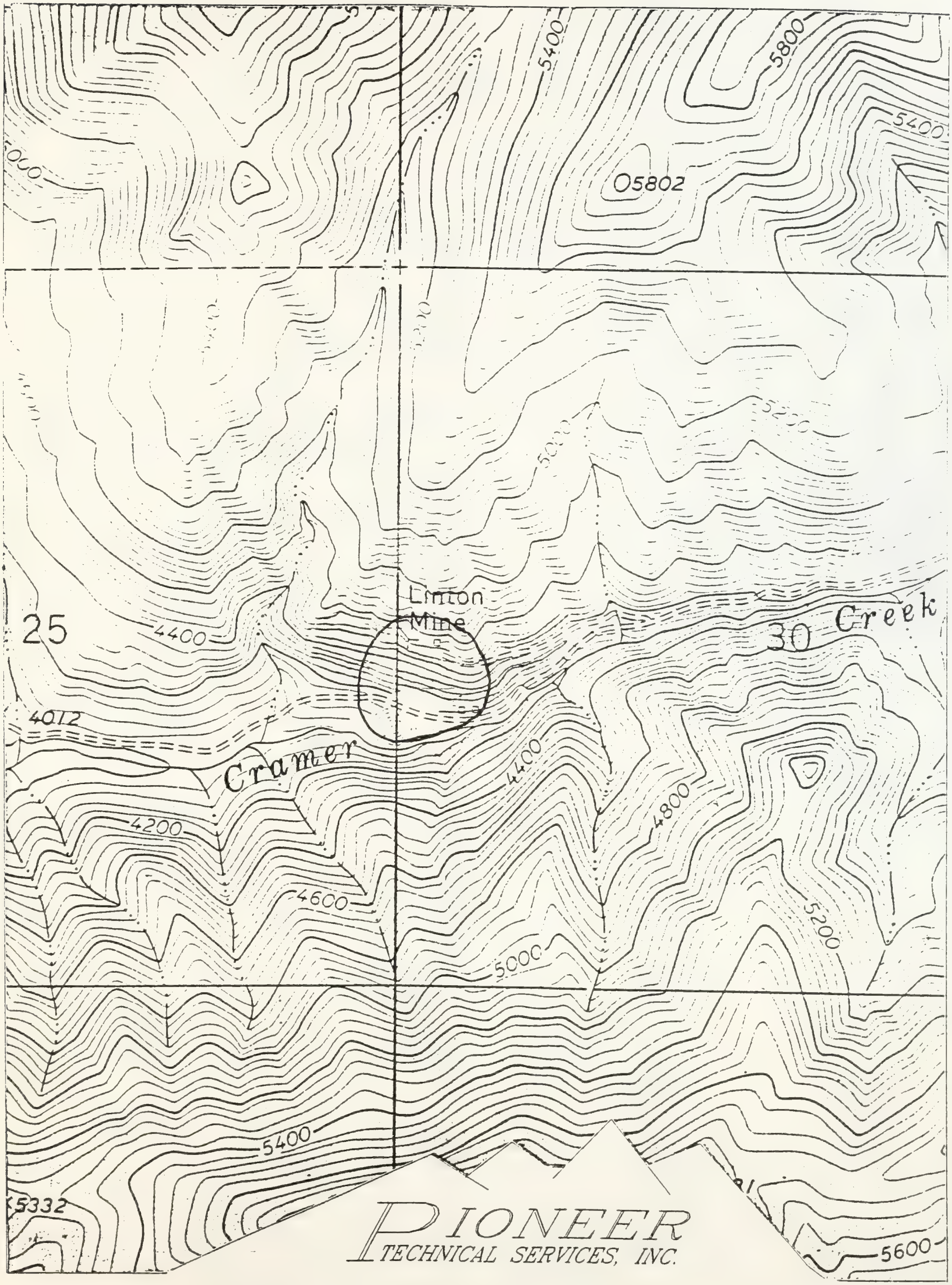
Mill Operation? Yes X , No___. If yes answer the next three questions:

Period(s) of Operation: Unknown to 1950's

Origin of Ore Milled - Custom Mill___ Dedicated Mill X ; Number and names of mines that supplied mill feed:

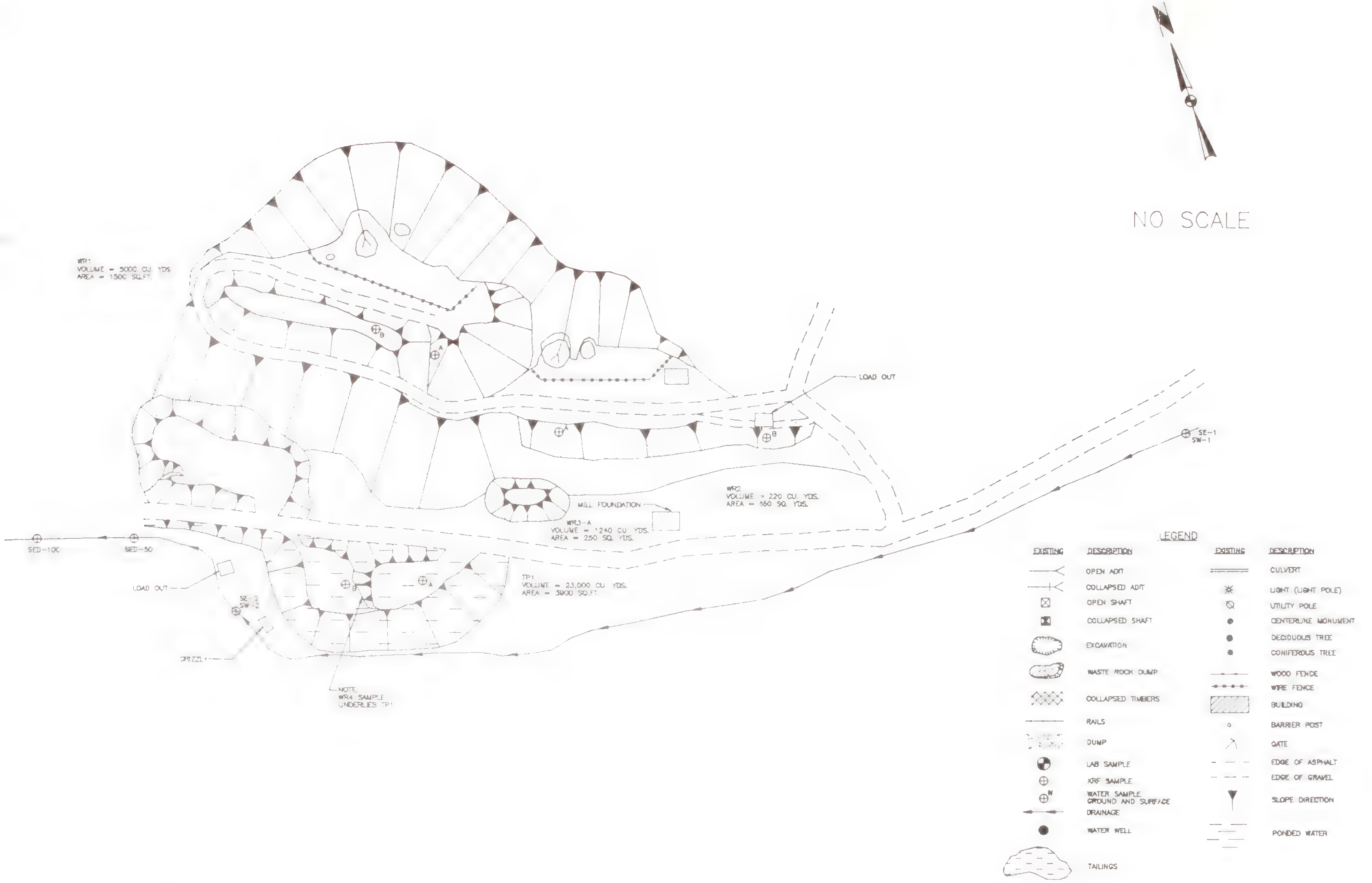
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Reported to have a 500-ton floatation mill, but size of foundation and tailings present does not support that claim.

l No.	Location	Depth	Yield	Static Water Level
27525	12N 15W 32	400.0	3.0	140.00



PIONEER
TECHNICAL SERVICES, INC.

LINTON, P.A. NO. 32-017
T12N, R15W, SECTION 30
SCALE: 1" = 1000'



DRAWN MEE DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TDH

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LINTON PA# 32-017

CRAMER CREEK DISTRICT MISSOULA COUNTY

SHEET NO.

32-017.DWG

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 95% medium brown sand; 5% yellowish-brown/dark brown clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): 7 foot dark brown layer on top of waste rock dump in drainage.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Severely eroded by Cramer Creek.

Comments on potential for mitigation: Pull back from stream into mill area; amend soil or topsoil if necessary, and revegetate.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	5,000	South of smaller openings of Adit #1; steep slope	None	6.8 (D)	0.04	32-017-WR-1	07/01/93 1700	T-Metals, ABA
WR-1B	WR		Southeast of large opening Adit #1 on flat waste area	None	6.8 (D)	0.03			
WR-1C	WR		Southwest of large opening Adit #1; side of flat area	None	6.9 (D)	0.04			
WR-1D	WR		Above millsite; talus area that may be waste rock pushed from top	None	6.9 (D)	0.04			
WR-2A	WR	220	South of large opening associated with Adit #2; steep face	None	6.8 (D)	0.05			
WR-2B	WR		Below loadout approx. 25'	None	6.9 (D)	0.03			
WR-2C	WR		On east facing slope around corner from loadout	None	6.9 (D)	0.03			
WR-3	WR	1,240	West of mill foundation; southwest corner	None	7.0 (D)	0.03	N/A	N/A	XRF Analysis
WR-4	WR	*	Waste rock underlying tailings	None	6.9 (D)	0.04	32-017-WR-4	07/01/93 1700	T-Metals, ABA
TP-1A-A	TAIL	23,000	0-5', dark brown/orange sand	None	6.9 (D)	0.03	32-017-TP-1	07/01/93 1700	T-Metals, ABA
TP-1A-B	TAIL		5-7', dark brown silt/sand	None	6.8 (D)	0.04			
TP-1B	TAIL		Cut face on Cramer Creek, composite; 0-7'	None	6.9 (D)	0.04			
UNK	Unknown	5	Gray material from below loadout	None	7.0 (D)	0.03	N/A	N/A	XRF Analysis
SE-50	WR		Waste rock in floodplain	None	6.8 (D)	0.03	N/A	N/A	XRF Analysis
SE-100	SE		Natural bank cut	None	5.9 (D)	0.05	N/A	N/A	XRF Analysis
SS-1	BKGRND	N/A	Background soil across valley from WR-2C	N/A	N/A	N/A	32-017-SS-1	07/01/93 1200	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-017-WR-1 is composite of WR-1A through -1C, and WR-2A through -2C. 32-017-WR-4 is grab of WR-4B. 32-017-TP-1 is composite of TP-1A-A and -1A-B, and TP-1B-A. *Volume for WR-4 is included in the TP-1 volume. ND = Not Determined

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_20___

Distance to nearest well used for drinking?_Approx. 1000 feet to the nearest residence which may have a well (did not see one).

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
No water associated with the upper portion of the site. Tailings are most likely in contact with groundwater, but have relatively low metals concentrations.

Other observations/notes:_N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Cramer Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1 and WR-4 are both next to Cramer Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 3.0 during investigation
High Flow: 10 cfs , Average Flow: 2.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Tailings lie next to Cramer Creek.

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe: Runoff only

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering, residential, fishery, and wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No _____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are actively eroding into the stream; historic placer tailings also present.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downstream in Cramer Creek	8.79	477	151	7.9	270	3.04 cfs (M)	32-017-SW-1	07/01/93 1120	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downstream in Cramer Creek	N/A	N/A	N/A	N/A	N/A	N/A	32-017-SE-1	07/01/93 1120	T-Metals
SW-2	SW	Upstream in Cramer Creek	8.68	491	125	8.1	108	2.87 cfs (M)	32-017-SW-2	07/01/93 1150	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upstream in Cramer Creek	N/A	N/A	N/A	N/A	N/A	N/A	32-017-SE-2	07/01/93 1150	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1 acre consisting of tailings area and some downstream

Wetlands present: Yes X , No ___, Describe: Small natural wetlands approx. 1/2 mile downstream

Carbonate rocks/soils: Yes X , No ___, Describe: Limestone present

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Approx. 1000 feet downgradient (west)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Dry	13,500	13,500	Yes	Low
WR-2	None	Dry	5,850	5,850	Yes	Low
WR-3	None	Dry	2,250	2,250	Yes	Low
TP-1	None	Partial	35,100	17,550	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:________

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes X , No___, Describe: Beer cans

Accessibility - Fences, warning signs, closed roads? Barbed wire fence around upper HMOs with signs; locked gate on drivable road. No restrictions to lower part of the site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes X , No___, Comment Bald Eagle
Bat Habitat - Yes X , No___, Comment Open adits

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 6 , types and locations: Four large openings associated with Adit #1; two large openings associated with Adit #2; all on upper half of site.

Hazardous structures: Yes X , No___, Number 1 , types and locations: Loadout on top

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 1 , types and locations: Banks on TP-1 on south side are undercut.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Linton, Prepared by Northern Engineering and Testing, July 3, 1987.

USGS, Topographic Map, Mineral Ridge, Montana, 7 1/2 minute Quadrangle, 1965.

LABORATORY ANALYTICAL DATA

LINTON MINE AND MILLSITE
PA NO. 32-017

Linton PA# 32-017
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/01/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-017-SE-1	168 J	2420 JX	0.5 U	14.8 JX	4.1	57.2 JX	6220	0.552 J	11400 J	15	5830	21	60 J	NR
32-017-SE-2	6 U	87.7 JX	0.6 U	2.5 UJX	6.6	10.4 JX	8010	0.16 J	410 J	9	88	8 U	65 J	NR
32-017-TP-1	1090 JX	7340	0.6 U	43.1 J	13.1 J	105	25900 J	1.41	34300 J	151 J	210 J	9 J	85 J	NR
32-017-WR-1	30 JX	12.2	0.5 U	1.1 U	2.2 J	155	3970 J	7.88	711 J	6 J	4890 J	28 J	56 J	NR
32-017-WR-4	136 J	694 JX	0.5 U	3.1 JX	1.7	183 JX	4690	0.04 J	3620 J	7	14100	34	36 J	NR
BACKGROUND	17 JX	95	0.5 U	1.9 J	5.4 J	17.6	8760 J	0.081	747 J	9 J	63 J	4 U	57 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-017-TP-1	<0.01	0	309	309	<0.01	<0.01	0.01	0	309
32-017-WR-1	0.01	0.31	960	960	0.01	<0.01	<0.01	0	960
32-017-WR-4	0.03	0.94	912	911	0.03	<0.01	<0.01	0	912

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32-017-SW-1	5.11 J	50 JX	2.57 U	9.7 U	6.83 U	1.55 U	66.4	0.038 U	4.9	12.7 U	1.25	30.7 U	7.57 U	213
32-017-SW-2	5.13 J	52.1 JX	2.57 U	9.7 U	6.83 U	1.55 U	51.6	0.038 U	4.08 U	12.7 U	1 U	30.7 U	7.57 U	214

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
32-017-SW-1	237	6.7	10	0.11	NR
32-017-SW-2	242	6.7	8	0.13	NR

LEGEND

SE1 – Downstream Cramer Creek.
SE2 – Upstream Cramer Creek.
TP1 – Composite of subsamples TP1A–A, 1A–B, and 1B–A.
WR1 – Composite of subsamples WR1A, 1B, 1C, 2A, 2B, and 2C.
WR4 – Sample of the WR4 subsample.
BACKGROUND – From the Linton Mine (32-017-SS-1).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

LINTON MINE AND MILLSITE
PA NO. 32-017

Mine Name: Linton PA# 31-017
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-017-SE-100		25437.7	15687.9	2210.37	150.36 *	365.522 *	25674.8		33.6917 *	36.3139 *		34.2719
32-017-SE-50	201.606 *	5525.19	96993.2	330.936 *	361.016 *	15462.5	12934.5		61.4252 *	32.0818 *	101.486 *	64.331
32-017-SS-1		9064.55	110279	1561.29	363.983 *	1243.39	12693.1			56.3937 *		83.5512
32-017-TP1A-A	480.98 *	4509.72	50896.2			31984.8	25056.5		79.7561 *		815.832	100.54
32-017-TP1A-B	481 $	4510 $	50896 $		148 $	31985 $	25057 $		80 $	22 $	816 $	101 $
32-017-TP1B-A		6117.38	71358.4		347.209 *	26104.3	31767.2		109.113 *	90.7598 *	1253.23	115.362
32-017-TP-1-COMP	386.745 *	5365.64	63850.6			32852.4	29083.8		144.574	64.8593 *	1053.63	123.93
32-017-UNK	258.671 *		201515		425.484 *	680.827 *	2199.71		91.0243 *			45.0154
32-017-WR1-A		5694.09	150592	877.211	389.6 *	1408.74	8684.32		113.239 *			81.1448
32-017-WR1-B			182065		420.019 *	573.268 *	3689.73		253.809	41.797 *		47.4359
32-017-WR1-C	208.98 *		178456		432.382 *	491.975 *	3345.08		262.438			36.6959
32-017-WR1-D			153729		510.765	520.22 *	3666.45		104.24 *			43.9654
32-017-WR2-A		6722.35	149400	811.327	381.929 *	1654.02	7354.33		81.1987 *			69.759
32-017-WR2-B		4948.81	152764	260.514 *	437.952 *	1281.3	5181.06		173.924			55.2544
32-017-WR2-C		2904.74	159297		435.537 *	1113.45	4501.91		174.591	53.3821 *		44.7078
32-017-WR3-A	216.549 *	3660.5	53830.9	313.349 *	325.453 *	28004.2	18784.4		94.7999 *		511.341	71.4078
32-017-WR4-B	556.661 *	833.386 *	184657		553.358 *	4531.94	8194.12		281.639	49.4782 *		64.406
32-017-WR-1-COMP		2746.47	159529	188.6 *	392.397 *	1145.79	4895.83		153.457			50.6528
32-017-WR-4		3508.06	123740	424.553 *	369.537 *	18217.3	15080.7		113.518 *	48.0749 *	238.651 *	75.1369
32-017-WR-4-COMP		1313.17 *	162246		422.872 *	6976.05	9640.48		207.242	39.4604 *		69.126

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-017-SE-100	203.918			19.5315 *	145.332			331.699			16.3705
32-017-SE-50	36.0083		4.09941 *	1687.67	46.358			2267.06	373.552 *		12.1989 *
32-017-SS-1	96.1949			76.9599	47.5682			151.639			5.70661 *
32-017-TP1A-A	53.1387		14.4975	158.369	23.2867 *			5084.36			6.0419 *
32-017-TP1A-B	53 $		14 $	158 $	23 $		36 $	5084 $	220 $		6 $
32-017-TP1B-A	72.1353		15.3436	147.488	29.1995		50.6142 *	3427.57			4.68356 *
32-017-TP-1-COMP	47.08		15.9453	151.505	32.231			4965.9	362.369 *		
32-017-UNK	5.15654 *			4312.28	18.9107 *				351.955 *		
32-017-WR1-A	59.0854			8796.47	35.3603 *		94.5865 *	72.4195			14.753 *
32-017-WR1-B			3.03136 *	4193.03	18.0457 *		95.7681 *				23.8745 *
32-017-WR1-C				3212.82	11.1104 *						14.1662 *
32-017-WR1-D	9.4728 *			1489.39	10.9072 *			13.439 *			
32-017-WR2-A	75.576			1532.37	31.2804		75.4008 *	93.4679			
32-017-WR2-B	33.1027			3623.12	29.2133 *		68.9997 *	44.4928 *			12.1045 *
32-017-WR2-C	18.306			4636.09	22.398 *		71.4256 *	19.8594 *			21.5865 *
32-017-WR3-A	26.0227		11.8971	27.4574 *	18.7917 *		46.5572 *	5354.39			3.36039 *
32-017-WR4-B	11.2554 *		4.67603 *	11045.5	21.891 *		89.9702 *	384.243			26.6578 *
32-017-WR-1-COMP	28.4916			4182.64	22.6748 *			38.1613 *	311.521 *		
32-017-WR-4	52.2915		8.79256 *	1355.47	26.1395 *		60.6479 *	2985.69	307.504 *		
32-017-WR-4-COMP	24.5194		4.82552 *	7951.03	23.4908 *		104.171 *	1193.64	429.927 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LINTON
PA NO. 32-017

AIMSS SCORESHEET

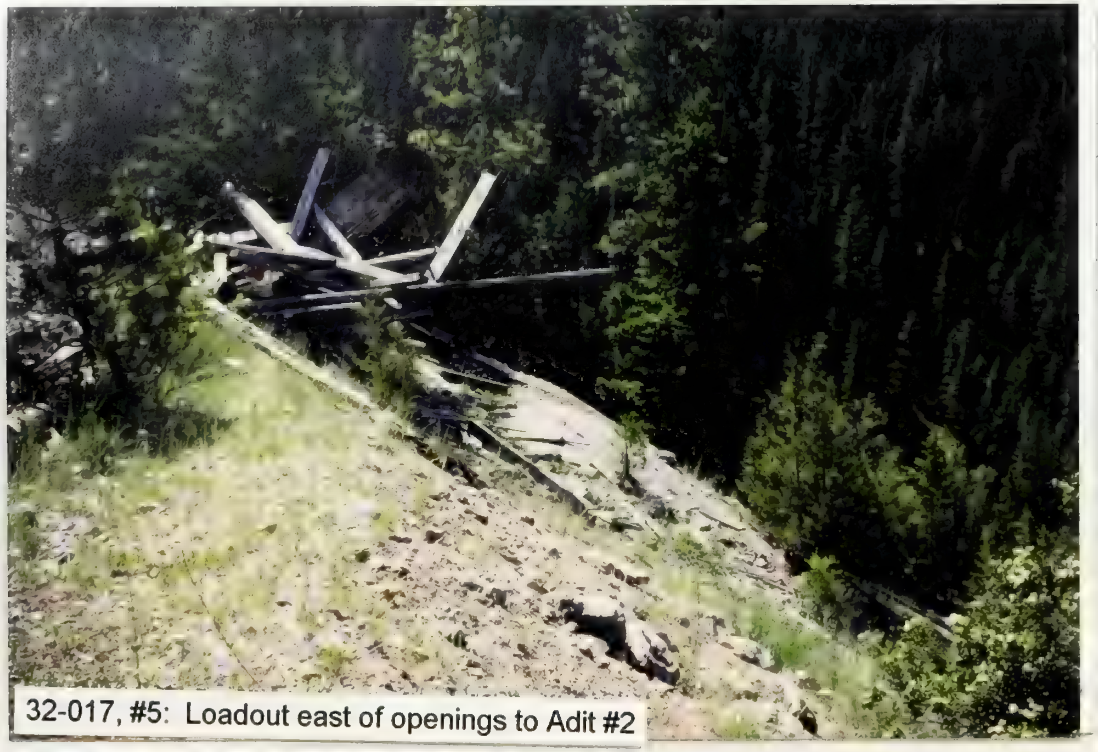
SITE NAME: LINTON MINE AND MILL
PA NUMBER: 32-017

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	170.315
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		19
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	26.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1805339
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	186.207
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	24
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	3128278
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.678
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1356
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.626
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	8
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	501
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**49.35**

SITE NAME: LINTON MINE AND MILL
PA NUMBER: 32-017

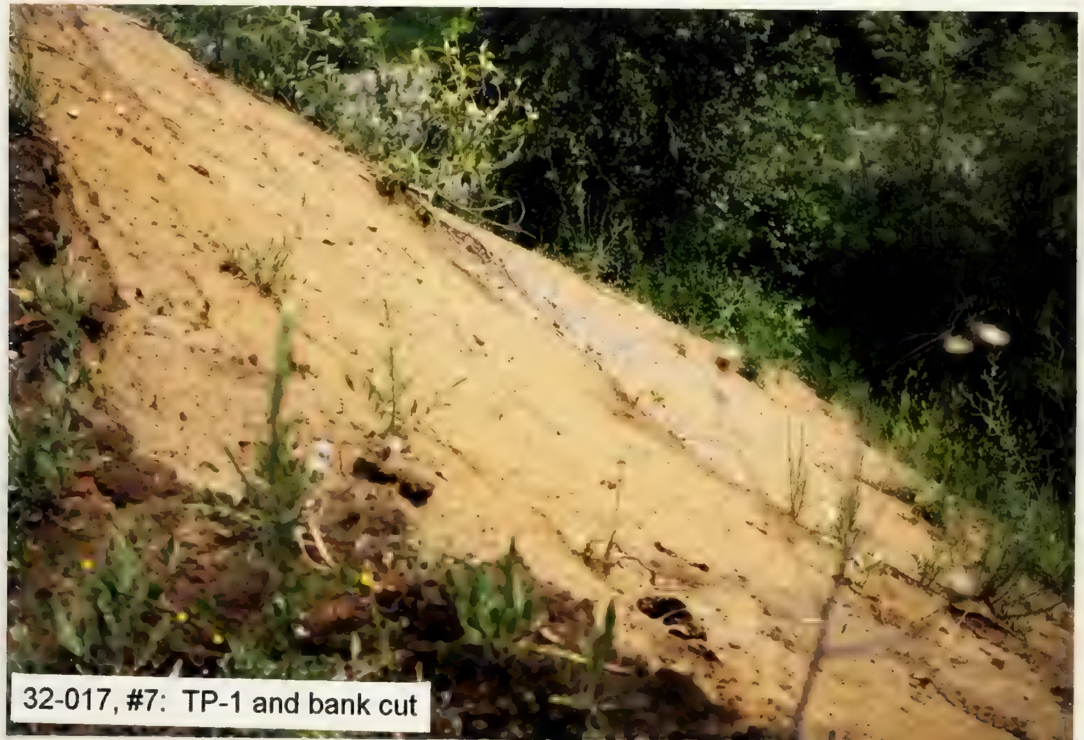
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	300
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	340
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	8
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**13.60**

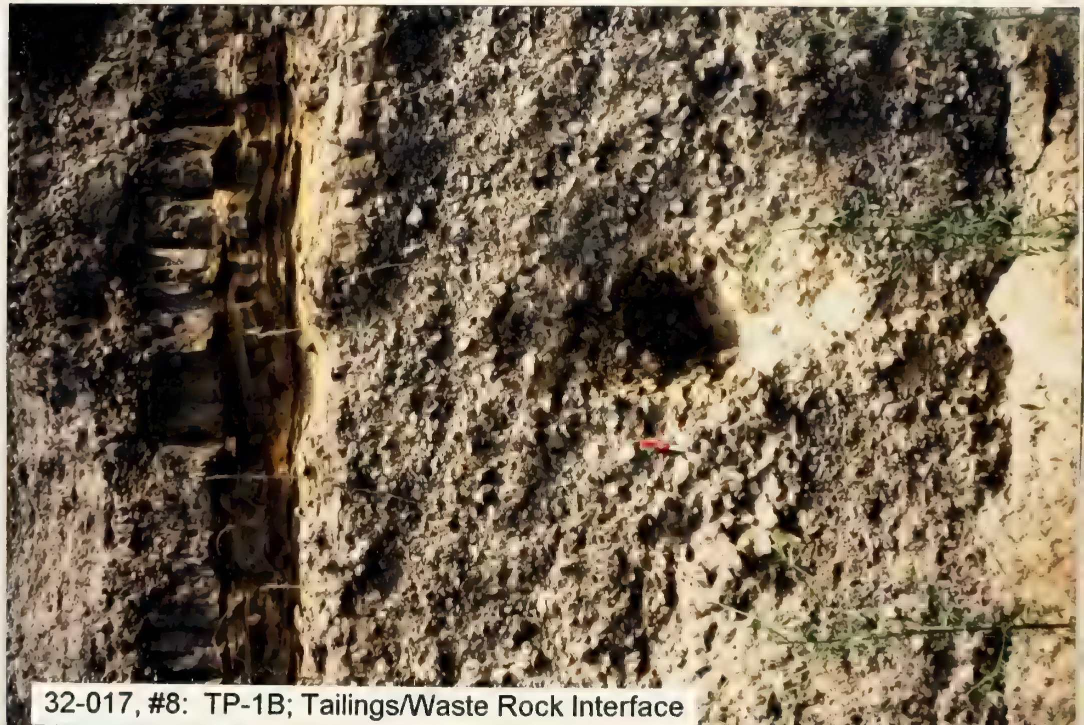


32-017, #5: Loadout east of openings to Adit #2

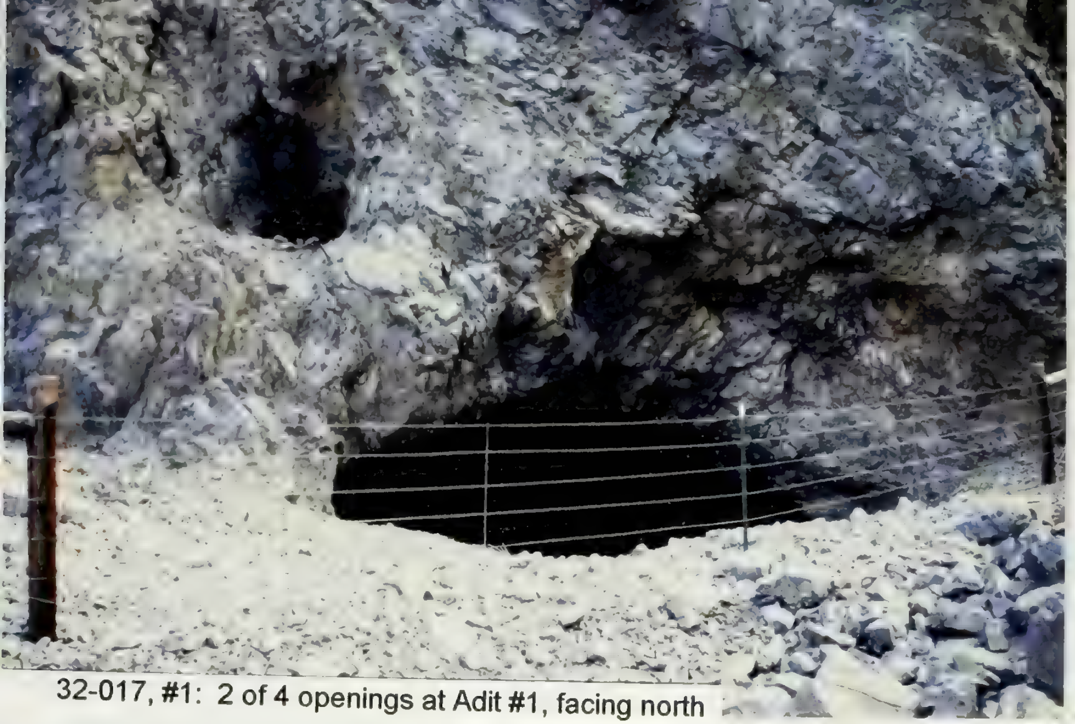
32-017, #6: SW-2 sample location



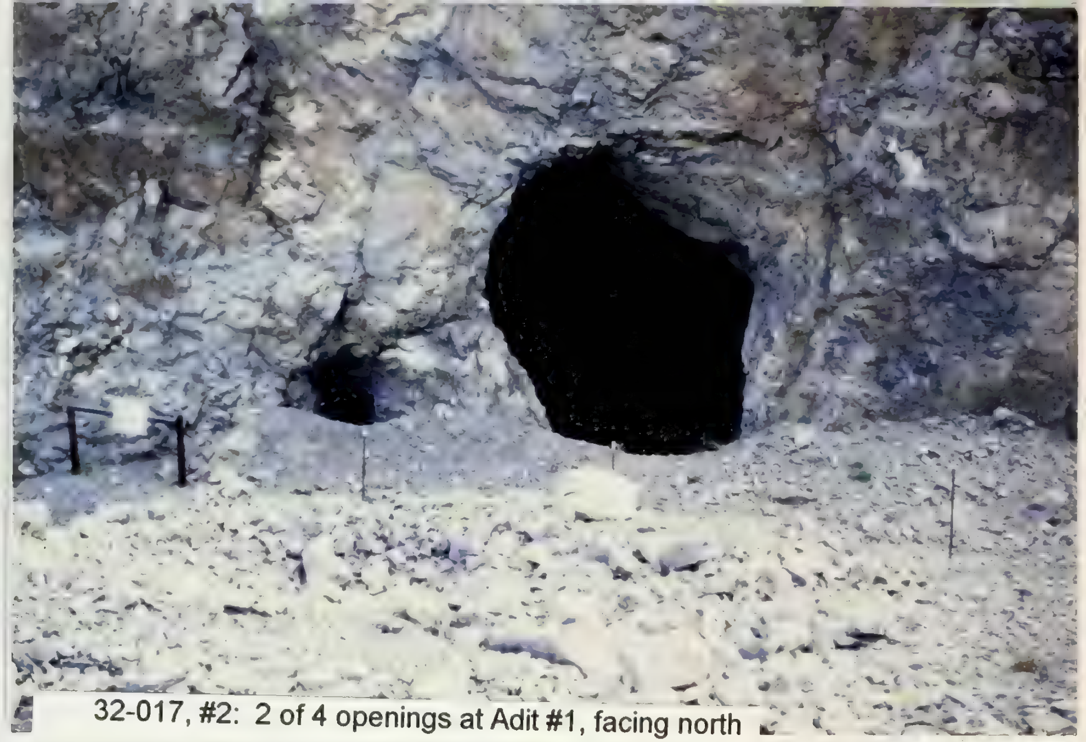
32-017, #7: TP-1 and bank cut



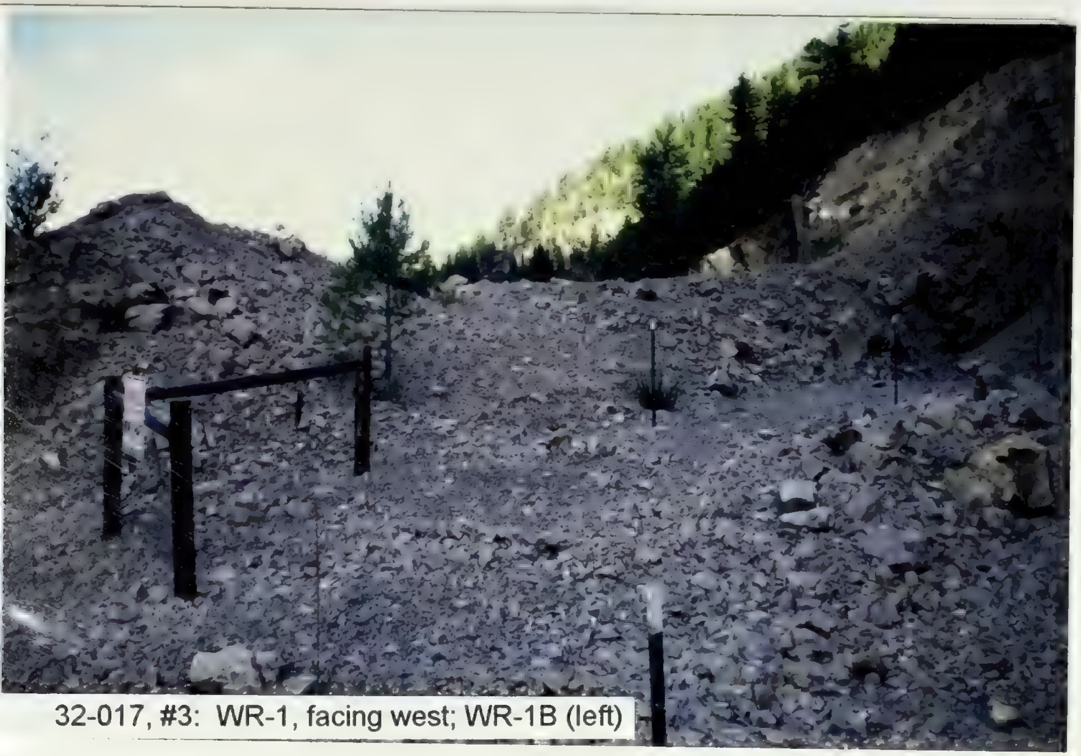
32-017, #8: TP-1B; Tailings/Waste Rock Interface



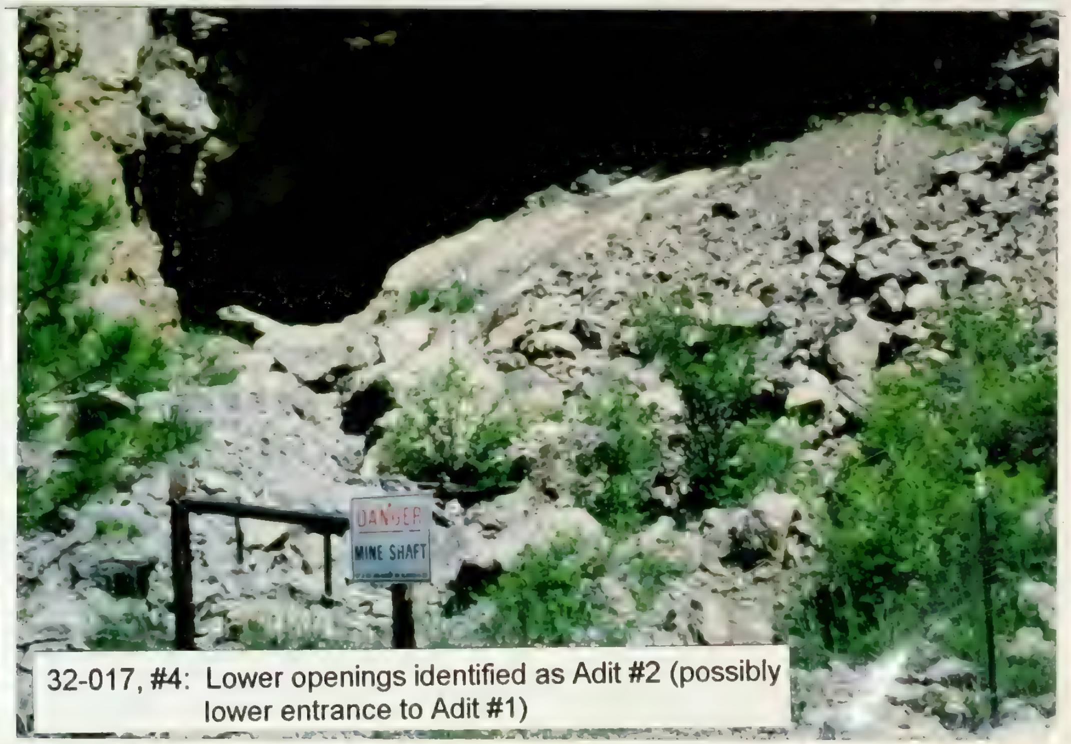
32-017, #1: 2 of 4 openings at Adit #1, facing north



32-017, #2: 2 of 4 openings at Adit #1, facing north



32-017, #3: WR-1, facing west; WR-1B (left)



32-017, #4: Lower openings identified as Adit #2 (possibly lower entrance to Adit #1)

32-017, #9: Grizzly

32-017, #10: Placer waste and trailer (nearest residence)

32-01
LINTON
#10

32-017
LINTON
#9

ELK CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MORSE & KENNEDY **PA#:** 32-033

Date: July 1, 1993 **Time:** 1530

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; warm (65°F); slight breeze (5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #19: Upper pit on north ridge; #20: Lower pit on north ridge; #21: Dumps at lower pit north ridge; #22: Collapsed shaft south ridge; #23: Adit south ridge. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Fill in pits with waste rock, recontour, and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MORSE & KENNEDY PA#: 32-033

Legal Description: T 13N ;R 14W ;Sec. 15 , N 1/2 ___ 1/4 ___ 1/4

County: MISSOULA Mining District: ELK CREEK

Latitude: N 46° 23' 20" Longitude: W 113° 21' 20"

Primary Drainage Basin and Code: Elk Creek/17010203
Secondary Drainage Basin: North Fork of Elk Creek

USGS Quadrangle map name(s): Bata Mountain

Mine Type/Commodities: Hardrock/Copper

Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N ___; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): MDSL, 1625 Eleventh Avenue, Helena, MT 59620. (406) 444-2074.

Relationship to other mines/sites in the area/district: Many mines in area

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4800'-5000' , Slope 15° ,
Aspect West and south

Land use: Mining X , Recreational X , Residential ___, Urban ___,
Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? 7 acres.
Dimensions: ___

Predominant vegetation types: Moderately wooded and lush grasses

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Cap Wallace Gulch flows east to west approx. 0.5 mile north of the site. North Fork Elk Creek flows east to west approx. 0.5 mile to the south of the site. The site is underlain by granodiorite and limestone contact.

Mining/milling history, ore type/tenor, host rock, gangue: Gold was first discovered at the head of Elk Creek sometime after 1865. Contact metamorphic deposit composed of garnet, epidote, calcite and quartz containing chalcopyrite, limonite, malachite, and chrysocolla.

Mine Operation?

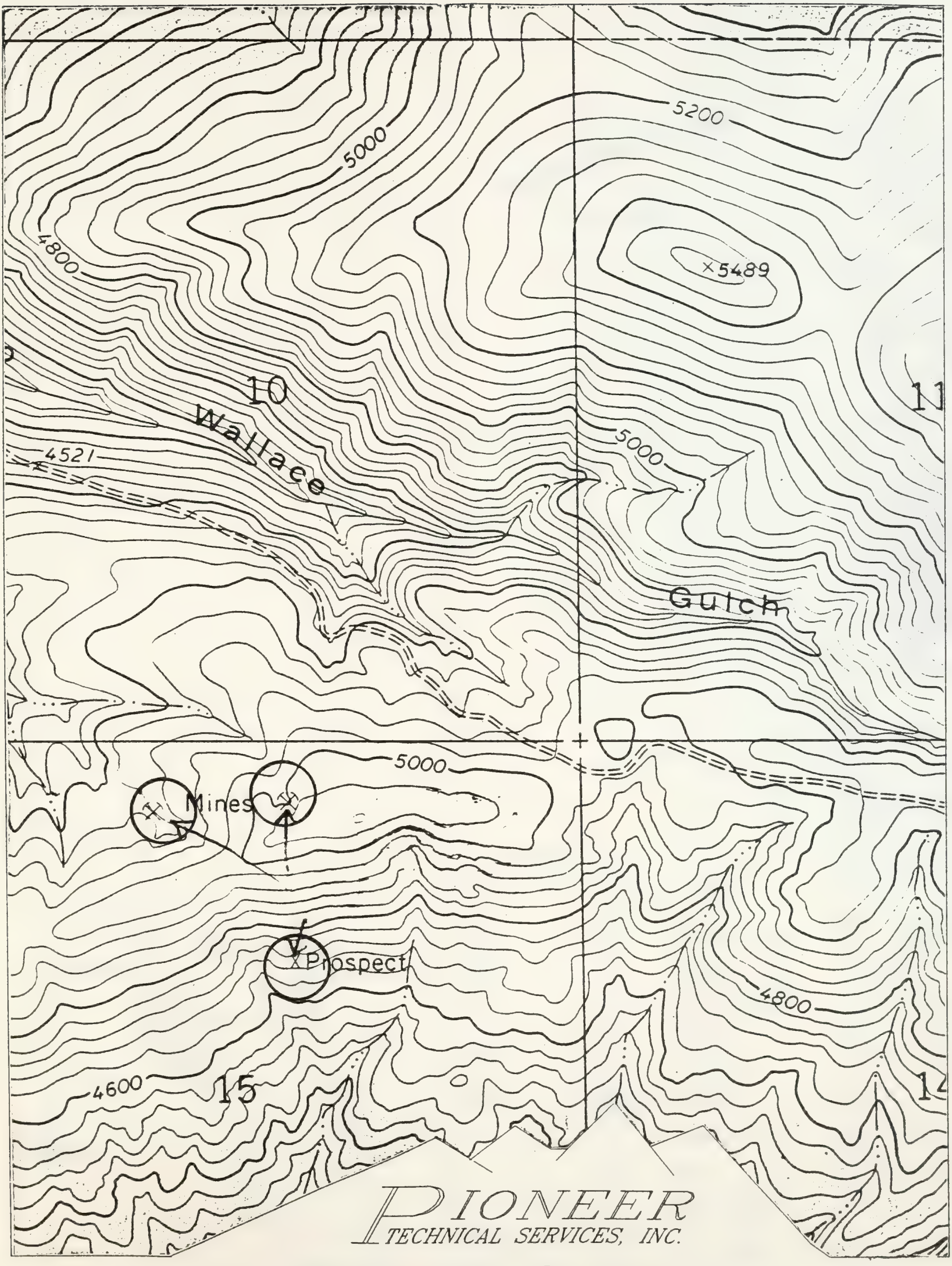
Shafts - Yes X, No___, # 1, Comment Caved
Adits - Yes X, No___, # 1, Comment Collapsed
Pits - Yes X, No___, # 2, Comment Very steep highwalls
Placers - Yes___, No___, # ___, Comment
Other - Yes___, No___, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

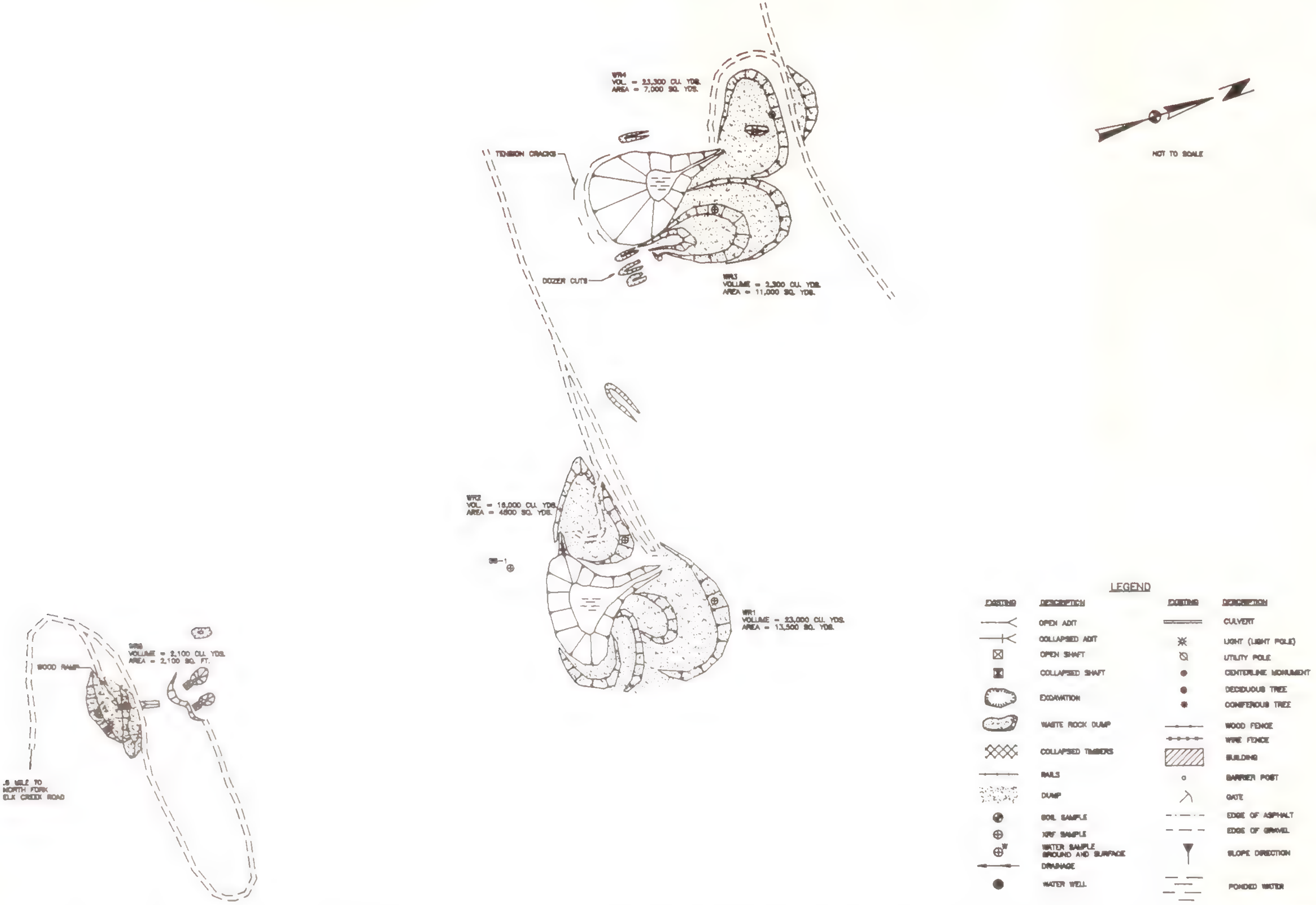


PIONEER
TECHNICAL SERVICES, INC.

MORSE & KENNEDY, P.A. NO. 32-033

T13N, R14W, SECTION 15

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	☀	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	⊘	UTILITY POLE
⧗	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
	EXCAVATION	●	DECIDUOUS TREE
		●	CONIFEROUS TREE
	WASTE ROCK DUMP	—•—	WOOD FENCE
		-•-•-•-	WIRE FENCE
⨯⨯⨯	COLLAPSED TIMBERS	▨	BUILDING
—•—	RAILS	○	BARRIER POST
	DUMP		GATE
●	SOIL SAMPLE	— · —	EDGE OF ASPHALT
⊕	XRF SAMPLE	— —	EDGE OF GRAVEL
⊕W	WATER SAMPLE GROUND AND SURFACE	▼	SLOPE DIRECTION
—•—	DRAINAGE		
●	WATER WELL	≡	PONDED WATER

DRAWN MEE DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MORSE KENNEDY PA# 32-033
ELK CREEK DISTRICT MISSOULA COUNTY

SHEET NO.

32-033.DWG

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	23,000	Eastern most dump; north side	None	6.5 (D)	0.05	32-033-WR-1	07/01/93 1825	T-Metals, ABA
WR-2	WR	15,000	West of WR-1; northeast side	None	5.6 (D)	0.05			
WR-3	WR	2,300	West of WR-2; west side	None	6.6 (D)	0.05			
WR-4	WR	23,300	Western most dump; north side	None	4.5 (D)	0.08			
WR-5A	WR	2,100	Southern most dump; south side	None	6.4 (D)	0.03	32-033-WR-2	07/01/93 1815	T-Metals, ABA
WR-5B	WR		Southern most dump; south side	None	6.2 (D)	0.05			
SS-1	BKGRND	N/A	Background soil	N/A	6.4 (D)	0.05	32-033-SS-1	07/01/93 1845	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-033-WR-1 is composite of WR-1 through -4. 32-033-WR-2 is composite of WR-5A and -5B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_5____

Distance to nearest well used for drinking?_2 miles_______

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, **Probable**____, **Possible**____, **Unlikely**_X__.
Uncontained sources, but metal values at or just above expected background levels; little water associated with the site.

Other observations/notes:_N/A_______

GROUNDWATER INVENTORY FORM

SAMPLERS:______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No___, Name(s)/Description: Ponded in pit (SW)

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
0.5 mile

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetland, fishery, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No___, Describe: N/A

Carbonate rocks/soils: Yes X , No___, Describe: Carbonate precipitate and limestone as bedrock in the area.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Moist	121,500	121,500	Yes	Low
WR-2	SO3	Moist	40,500	40,500	Yes	Low
WR-3	SO3	Moist	99,000	99,000	Yes	Low
WR-4	SO3; pH	Moist	63,000	63,000	Yes	Low
WR-5	SO3	Moist	18,900	18,900	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:__________

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__________

Evidence of recreational use on site: Yes___, No X , Describe:_______

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment__________
Wilderness Area - Yes___, No X , Comment__________
T&E Species Habitat - Yes X , No___, Comment Peregrine, Bald Eagle
Bat Habitat - Yes___, No X , Comment__________

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium X , Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 2 ,
types and locations: Highwalls at pits

Unstable waste piles, impoundments, undercut banks: Yes____, No X ,
Number____, types and locations:__________

Fire and/or Explosion hazards: Yes___, No X , Explain:__________

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Morse and Kennedy, Prepared by Northern Engineering and Testing, June 16, 1986.

USGS, Topographic Map, Bata Mountain, Montana, 7 1/2 minute Quadrangle, 1965.

LABORATORY ANALYTICAL DATA

MORSE AND KENNEDY
PA NO. 32-033

Morse & Kennedy PA# 32-033
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/01/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-033-WR-1	4 U	3810 JX	0.4 U	5.4 JX	18.5	10.8 JX	10400	0.051 J	290 J	11	7 U	6	11 J	NR
32-033-WR-2	12 J	166 JX	0.5 U	6 JX	5.6	29.6 JX	9160	1.08 J	815 J	11	111	13	64 J	NR
BACKGROUND	5 U	322 JX	0.6 U	5.6 JX	10	10.4 JX	9450	0.071 J	640 J	8	9 U	7 U	30 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-033-WR-1	<0.01	0	29.7	29.7	<0.01	<0.01	<0.01	0	29.7
32-033-WR-2	<0.01	0	506	506	<0.01	<0.01	0.01	0	506

LEGEND

WR1 – Composite of subsamples WR1, 2, 3, and 4.
WR2 – Composite of subsamples WR5A and 5B.
BACKGROUND – From Morse and Kennedy Mine (32-033-SS-1)

XRF ANALYSIS RESULTS

MORSE AND KENNEDY
PA NO. 32-033

Mine Name: Morse & Kennedy PA# 32-033
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-033-SS-1		16906.8	11327	1801.43		1253.49	15681.4			84.4098 *	35.9912 *	82.2453
32-033-WR5-A		4318.26	134732	301.57 *	346.311 *	1667.44	18984.4			134.199 *	44.2269 *	68.8566
32-033-WR5-B		12257.1	151372	765.526	169.284 *	396.399 *	12769.8			145.635 *	71.9687 *	173.436
32-033-WR-1		27103.3	2323.43	1363.59	297.56 *	343.253 *	12135.9			41.5227 *	30.8306 *	140.664
32-033-WR-1-COMP		24359.1	3879.4	1346.24			17838.2			39.382 *	29.7063 *	168.937
32-033-WR-2		21954.5	2011.61	950.836	267.514 *		12100.1			64.0362 *	26.5159 *	247.669
32-033-WR-2-COMP		11986.1	151286	753.409		1041.47 *	18345.3			112.391 *	49.1481 *	131.121
32-033-WR-3		27076.9	3370.4	1585.47	161.067 *		17354.6			55.0743 *	32.4638 *	42.0749
32-033-WR-4		27191.8	5285.98	1920.72		486.304 *	23235.3					129.672

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-033-SS-1	222.428				87.5955			404.579			7.51985 *
32-033-WR5-A	19.4637			33.3595 *	27.9491 *	121.821 *		565.688	79.2307 *		
32-033-WR5-B	82.1886			142.084	71.0614		155.782 *	312.107			7.04014 *
32-033-WR-1	221.192				136.227	114.044 *		9006.99	77.2884 *		9.77179 *
32-033-WR-1-COMP	243.853				126.911			14270.8	63.1572 *		
32-033-WR-2	212.541				100.825			21821.9	64.0403 *		9.08201 *
32-033-WR-2-COMP	52.5395			96.658	65.5143			485.466	115.465 *		
32-033-WR-3	212.93				132.089			954.216			11.6938 *
32-033-WR-4	258.227				162.267			5996.72		33.9206 *	16.7358 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MORSE & KENNEDY
PA NO. 32-033

AIMSS SCORESHEET

SITE NAME: MORSE & KENNEDY
PA NUMBER: 32-033

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.569
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	569

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.622
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	572

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.029
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	7

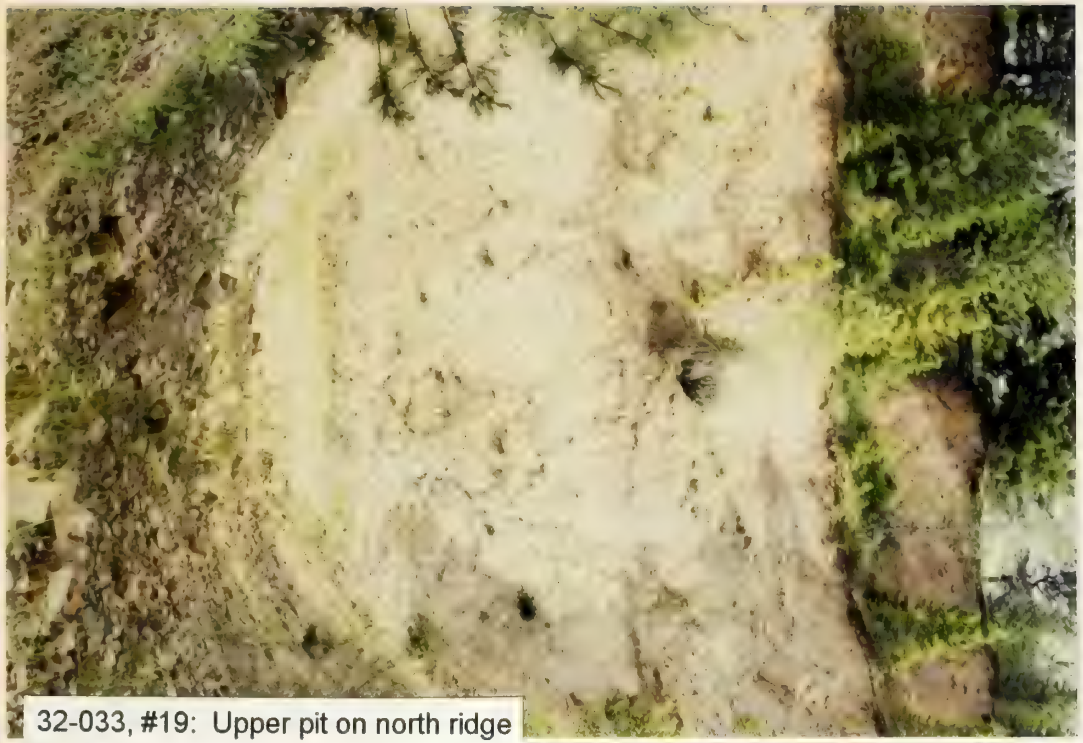
DIRECT CONTACT PATHWAY

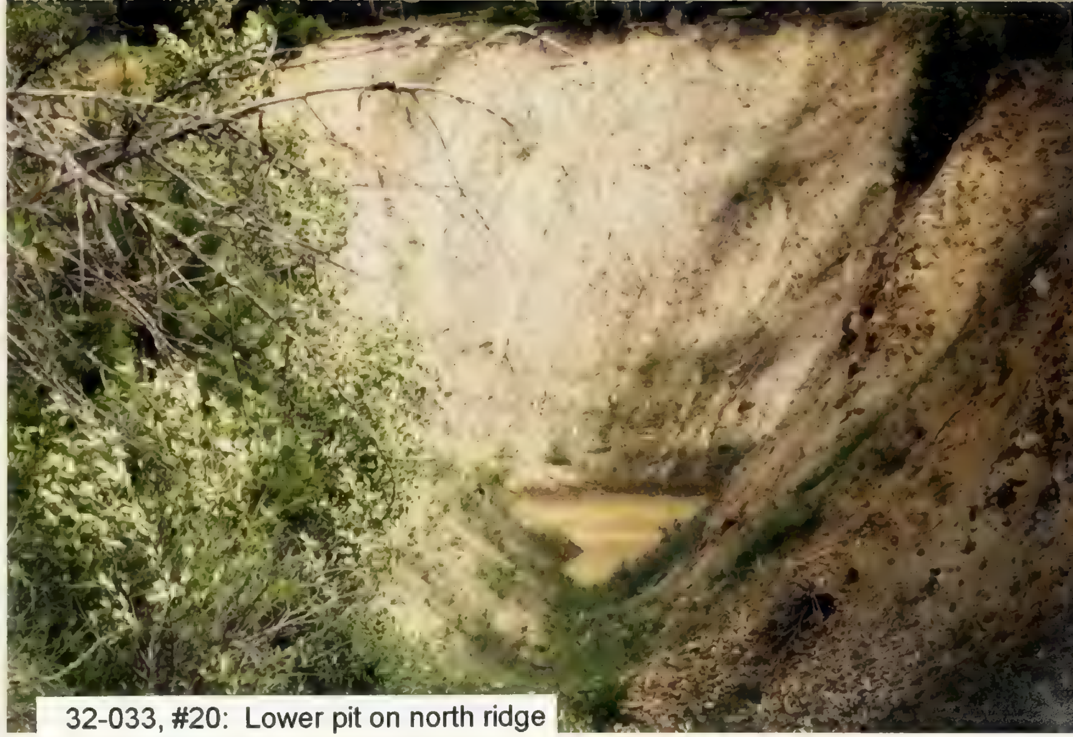
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.027
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3

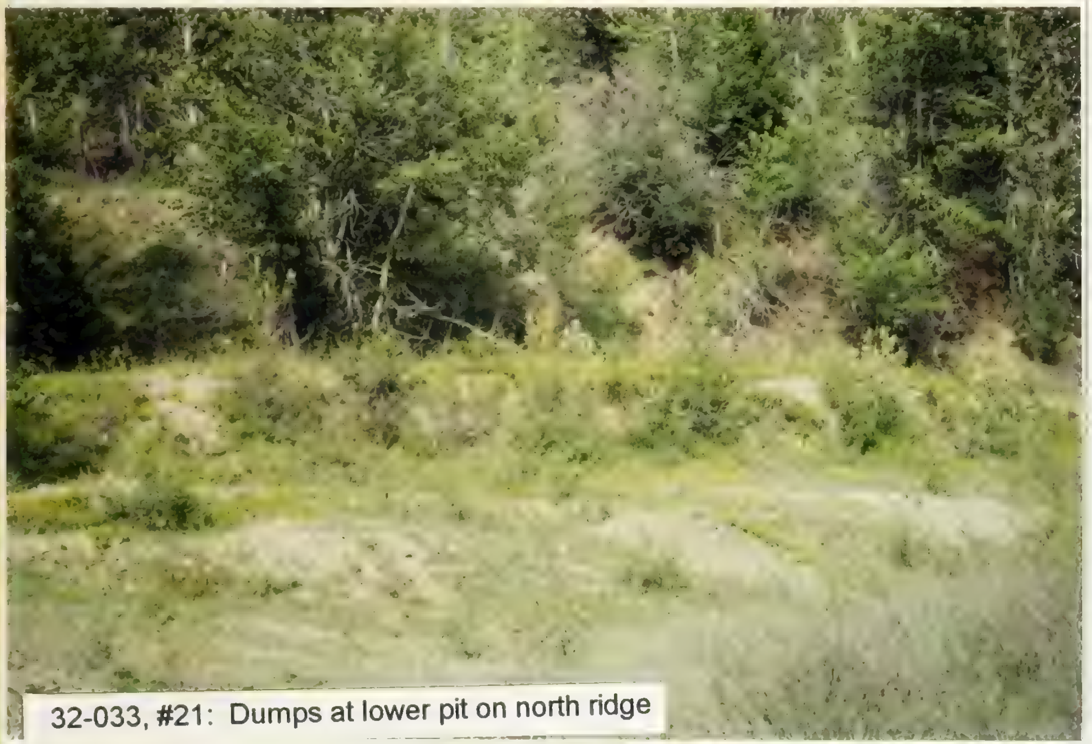
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.01**

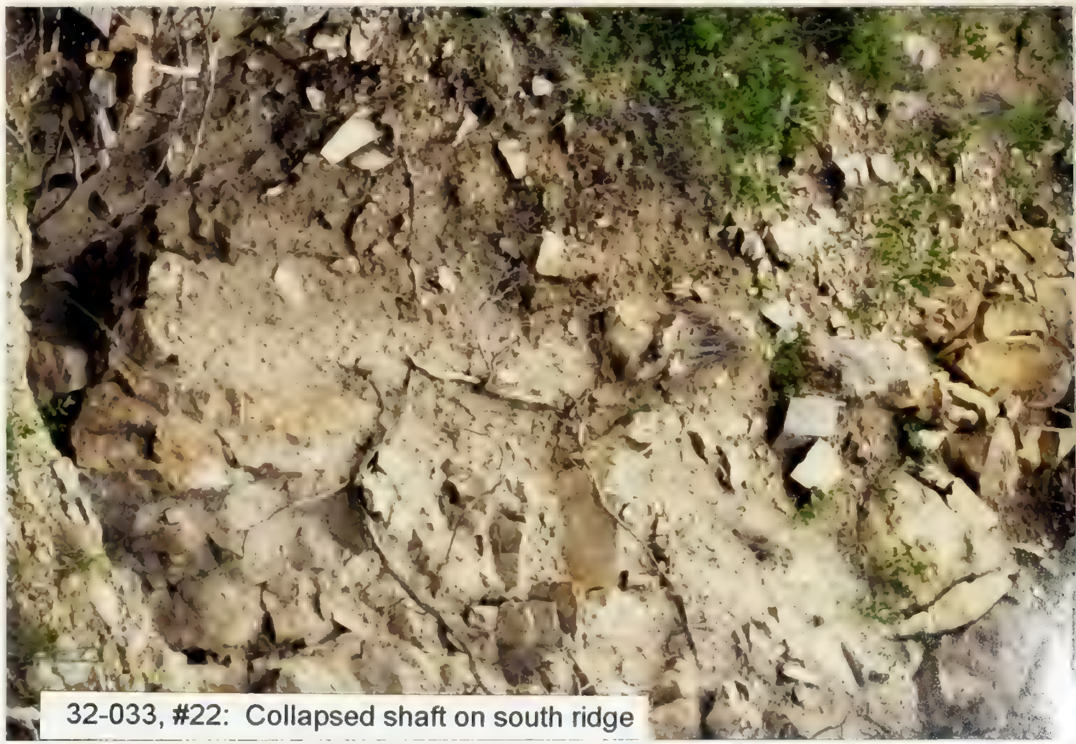
SITE NAME: MORSE & KENNEDY
PA NUMBER: 32-033

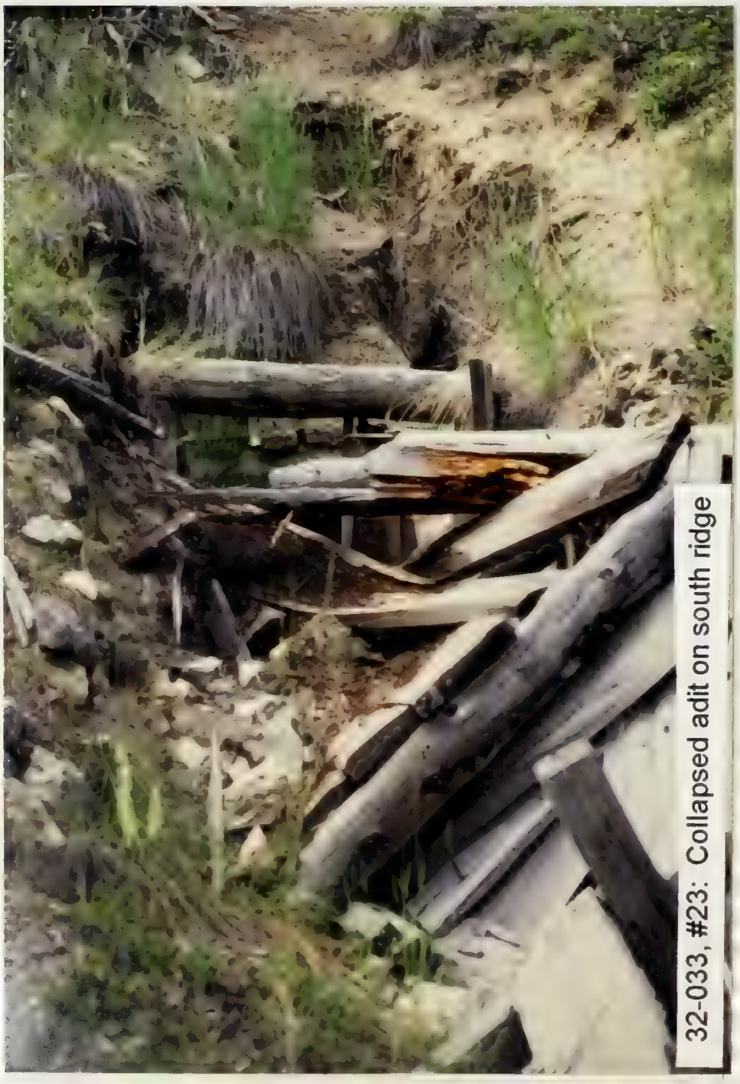
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	150
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**3.00**


32-033, #19: Upper pit on north ridge


32-033, #20: Lower pit on north ridge


32-033, #21: Dumps at lower pit on north ridge


32-033, #22: Collapsed shaft on south ridge



32-033, #23: Collapsed adit on south ridge

NINEMILE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: JOE WALLIT MINE **PA#:** 32-010

Date: July 2, 1993 **Time:** 0900

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Raining; cool (50°F); slight breeze (5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #24: SW-3 location; #25: Seep at base of waste rock; #26: Seep flowing into St. Louis Creek. No video was taken due to rain.

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Fill pit with waste rock; recontour and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): JOE WALLIT MINE PA#: 32-010

Legal Description: T 17N ;R 24W ;Sec. 8 ,NW 1/4NW 1/4___1/4

County: MISSOULA Mining District: NINEMILE

Latitude: N 47° 15' 11" Longitude: W 114° 41' 11"

Primary Drainage Basin and Code: Ninemile Creek/17010204
Secondary Drainage Basin: St. Louis Creek

USGS Quadrangle map name(s): Knowles

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: Many mines in district

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4600', Slope 45°, Aspect North

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3 acres.
Dimensions:

Predominant vegetation types: Forested

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the north side of perennial St. Louis Creek, which flows west past the site. East Fork St. Louis Creek flows north to south and enters St. Louis Creek in the middle of the site. St. Louis Creek flows into perennial Ninemile Creek 1.5 miles south of the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

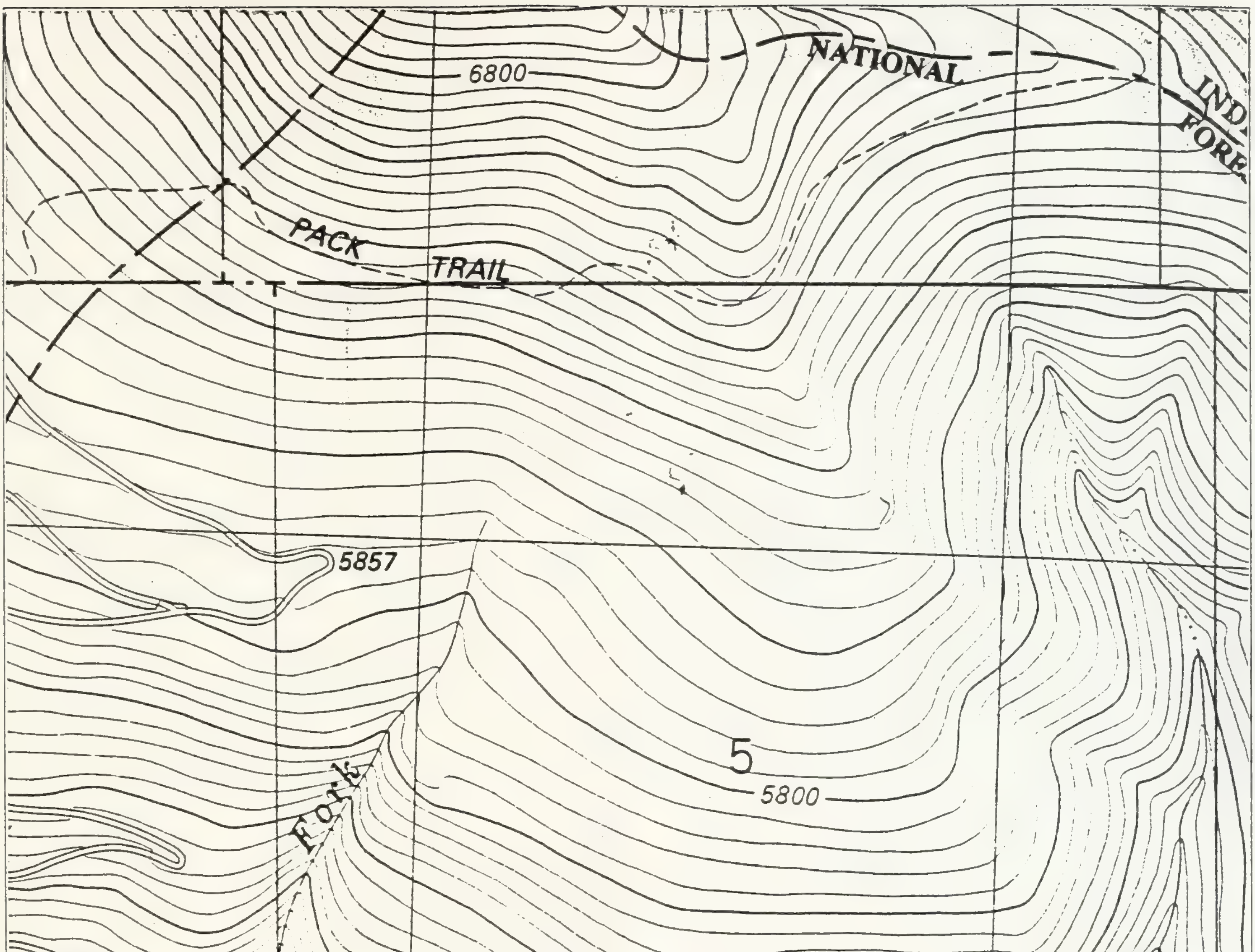
Mine Operation?
Shafts - Yes___, No X, # ___, Comment___
Adits - Yes___, No X, # ___, Comment___
Pits - Yes X, No___, # 1, Comment___
Placers - Yes___, No X, # ___, Comment___
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

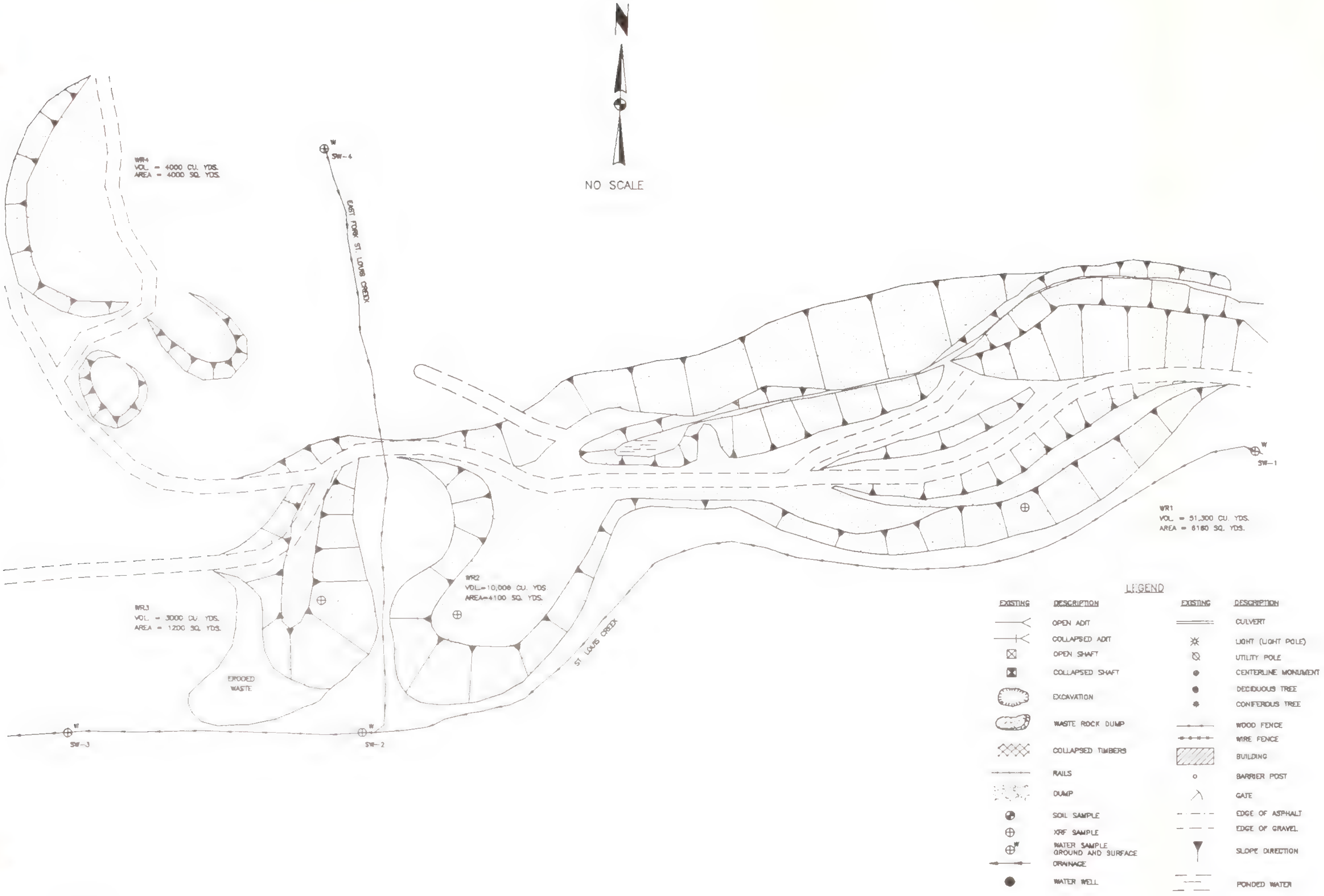
Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

JOE WALLIT, P.A. NO. 32-010

T17N, R24W, SECTION 08
SCALE: 1" = 1000'



PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MEE
DESIGNED TPR
APPROVED
DATE 11/93
JOB NO. 93-17
F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
JOE WALLIT PA# 32-010
NINEMILE DISTRICT MISSOULA COUNTY

SHEET NO.

32-010.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	51,300	Southeast side of pit	None	6.2 (D)	0.05	32-010-WR-1	07/02/93 1840	T-Metals, ABA
WR-2	WR	10,000	Southwest side of pit; south side on top	None	5.9 (D)	0.06			
WR-3	WR	3,000	Southwest side of pit	None	6.8 (D)	0.06			
WR-4	WR	4,000	East side of access road	None	6.8 (D)	0.05			
SS-1	BKGRND	N/A	Background soil	N/A	6.8 (D)	0.03	32-010-SS-1	07/02/93 1330	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-010-WR-1 is composite of WR-1, -2, -3, and -4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_At base of WR-2

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_1_

Distance to nearest well used for drinking?_3 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Uncontained sources containing only slightly elevated levels of Cu, but are in floodplain (shallow aquifer).

Other observations/notes:_N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No___, Name(s): East Fork St. Louis Creek; St. Louis Creek

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No___, Name(s)/Description: Seep at WR-2

Waste materials within any floodplain: Yes X , No___ Source ID(s): Dumps at St. Louis Creek

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 11 during investigation
High Flow: 70 cfs , Average Flow: 10 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Perennial stream

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
No turbidity or sedimentation problems observed.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient of St. Louis Creek	8.77	110	284.9	8.1	33	11 cfs (M)	32-010-SW-1	07/02/93 1110	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient of St. Louis Creek	N/A	N/A	N/A	N/A	N/A	11 cfs (M)	32-010-SE-1	07/02/93 1110	T-Metals
SW-2	SW	Below confluence of East Fork St. Louis Creek in St. Louis Creek	8.71	80	159.8	7.6	25	11 cfs (M)	32-010-SW-2	07/02/93 1010	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Below confluence of East Fork St. Louis Creek in St. Louis Creek	N/A	N/A	N/A	N/A	N/A	11 cfs (M)	32-010-SE-2	07/02/93 1010	T-Metals
SW-3	SW	Downgradient of last dump on St. Louis Creek	8.61	100	168	8	35	11 cfs	32-010-SW-3	07/02/93 0940	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-4	SW	Upgradient on East Fork of St. Louis Creek	8.44	80	254.2	7.4	9	14 cfs	32-010-SW-4	07/02/93 1150	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes X, No ___, Describe: Streambank only

Carbonate rocks/soils: Yes ___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 3 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Moist	55,440	55,440	No	Low
WR-2	SO3	Moist	36,900	36,900	No	Low
WR-3	SO3	Moist	10,800	10,800	No	Low
WR-4	SO3	Moist	36,000	36,000	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Gun shell casings

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes___, No_X_, Comment____________________
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations: Highwall at pit

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Joe Wallit, Prepared by Northern Engineering and Testing, September 10, 1988.

USGS, Topographic Map, Knowles, Montana, 7 1/2 minute Quadrangle, 1984.

LABORATORY ANALYTICAL DATA

JOE WALLIT
PA NO. 32-010

Joe Wallit PA# 32-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-010-SE-1	10 J	44.7 JX	0.5 U	5.3 JX	3.5	11.4 JX	15300	0.066 J	251 J	14	12	6	64 J	NR
32-010-SE-2	32 J	49.5 JX	0.5 U	7.5 JX	2.1	739 JX	18100	0.062 J	1000 J	9	20	12	74 J	NR
32-010-WR-1	31 J	64.6 JX	0.5 U	6.7 JX	2.3	338 JX	16000	0.137 J	807 J	9	98	13	136 J	NR
BACKGROUND	8 J	336 JX	0.9	5.9 JX	2.2 U	12.1 JX	8140	0.18 J	1730 J	8	41	10 U	57 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-010-WR-1	0.01	0.31	56.7	56.3	<0.01	0.02	<0.01	0.62	56

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32-010-SW-1	3.65 J	4.8 JX	2.57 U	9.7 U	6.83 U	1.55 U	12.3	0.120	4.08 U	12.7 U	1.5	30.7 U	12.9	37.8
32-010-SW-2	3.7 J	2.01 UJX	2.57 U	9.7 U	8.83	1.55 U	19.7	0.160	4.08 U	12.7 U	3.43	30.7 U	7.57 U	16.1
32-010-SW-3	3.82 J	3.17 JX	2.57 U	9.7 U	6.83 U	1.7 J	54	0.200	23.1	12.7 U	1 U	30.7 U	7.57 U	30.7
32-010-SW-4	3.01 J	2.3 JX	2.57 U	9.7 U	6.83 U	15 J	39.3	0.190	4.4	12.7 U	2.88	30.7 U	7.57 U	19.6

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
32-010-SW-1	77	< 5.0	< 5	< 0.05	NR
32-010-SW-2	56	< 5.0	< 5	< 0.05	NR
32-010-SW-3	61	< 5.0	< 5	< 0.05	NR
32-010-SW-4	59	6.7	< 5	< 0.05	NR

LEGEND

SE1 – Upgradient in St. Louis Creek.
SE2 – Below confluence of East Fork St. Louis Creek in St. Louis Creek.
WR1 – Composite of subsamples WR1, 2, 3, and 4.
BACKGROUND – From the Joe Wallit Mine (32-010-SS-1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW3 – Downgradient of last dump in St. Louis Creek.
SW4 – Upgradient in East Fork of St. Louis Creek.

XRF ANALYSIS RESULTS

JOE WALLIT
PA NO. 32-010

Mine Name Joe Wallit PA# 32-010
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-010-SS-1			11964.5	2469.08		2162.04	16680			150.521 *	52.7035 *	180.328
32-010-WR-1		27697.6	3550.08	1716.46		960.323 *	21225.9		45.339 *	144.922 *		36.3992
32-010-WR-1-COMP			6185.01	2072.35		742.591 *	19003.3		249.99	98.5527 *		42.7099
32-010-WR-2		31146.9	6623.21	2398.51		628.117 *	22902.5		292.026	89.1211 *	59.3569 *	65.8338
32-010-WR-3			6551.55	2447.09		629.17 *	22953.8		330.166	73.2112 *	52.5309 *	68.0872
32-010-WR-4			12364.8	2123.52		664.38 *	19200.8		526.478	114.074 *	44.5031 *	71.6056
	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th	
	153.606			16.2684 *	46.1845			191.023				
32-010-SS-1	227.154			100.314	170.116	115.065 *		905.839		14.6659 *		
32-010-WR-1	243.391			77.9528	182.256	140.395 *		934.395			13.1923 *	
32-010-WR-1-COMP	280.74				165.402			806.432			10.1645 *	
32-010-WR-2	293.186				167.265	164.986 *		768.952			12.8826 *	
32-010-WR-3	234.466			22.2765 *	174.105	132.705 *	53.5506 *	912.409	75.7617 *			
32-010-WR-4												

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

JOE WALLIT
PA NO. 32-010

AIMSS SCORESHEET

SITE NAME: JOE WALLIT MINE
PA NUMBER: 32-010

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.525
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	1.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1010

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.033
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	40946

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.101
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	10

DIRECT CONTACT PATHWAY

LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.084
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	63

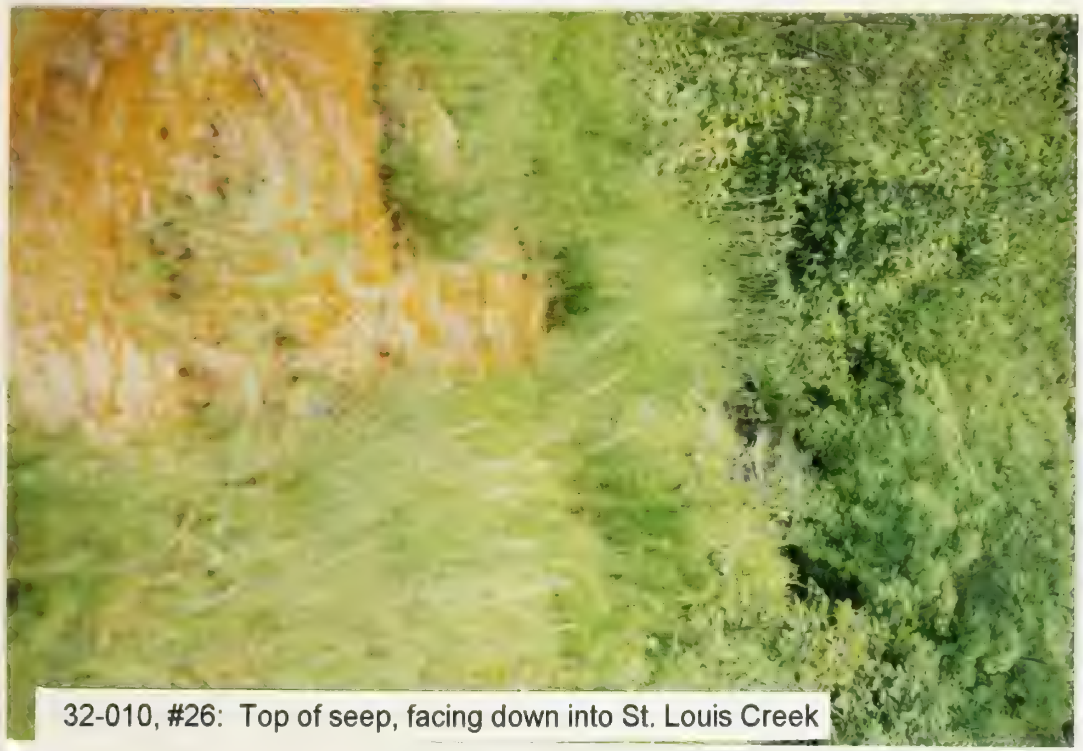
LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.42**

SITE NAME: JOE WALLIT MINE
PA NUMBER: 32-010

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	75
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**7.50**

32-010, #24: SW-3 sample location downgradient of lowest dump

32-010, #25: Seep at base of WR-2 flowing into St. Louis Creek



32-010, #26: Top of seep, facing down into St. Louis Creek

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LOST CABIN MINE PA#: 32-011

Date: July 2, 1993 Time: 1025

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Constant drizzle; 55°F; calm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #16: Collapsed adit on east bank; #17: WR-1; #18: SW-1 location. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate waste material from the drainage, amend, and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LOST CABIN MINE PA#: 32-011

Legal Description: T 16N ;R 22W ;Sec. 13 , SE1/4 NE1/4 ___1/4

County: MISSOULA Mining District: NINE MILE

Latitude: N 47° 08' 56" Longitude: W 114° 26' 40"

Primary Drainage Basin and Code: Kennedy Creek/17010204
Secondary Drainage Basin: Kennedy Creek

USGS Quadrangle map name(s): McCormick Peak

Mine Type/Commodities: Hardrock/Zinc, Lead, Copper, Silver, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: Hautilla and Nugget sites are in the same host rock on similar shear zones and in very close proximity to each other.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4200' , Slope 10°-25° , Aspect Eastern

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.45 acres.
Dimensions:

Predominant vegetation types: Larch, Engelman spruce, hemlock, western red cedar, Ponderosa pine, cottonwoods, nine bark, alder

Access: roads - good___,poor X ,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Poor bridge; locked gate 250' south of mine; 1/2 mile above Hautilla mine and 3/4 mile above Nugget mine

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Area is underlain by massive bandled gray argillite. Site is cut by perennial Kennedy Creek which flows south through the site.

Mining/milling history, ore type/tenor, host rock, gangue: Ore minerals include pyrite, chalcopyrite, and some sphalerite in sheared quartz. Mineralization occurred in shear zone in the host argillite. 480 tons were shipped to Nancy Lee Mill - Slowey assayed 23.7% Zn, 9.8% Pb, 0.43% Cu, .10 oz. Au, 4.0 oz. Ag per ton.

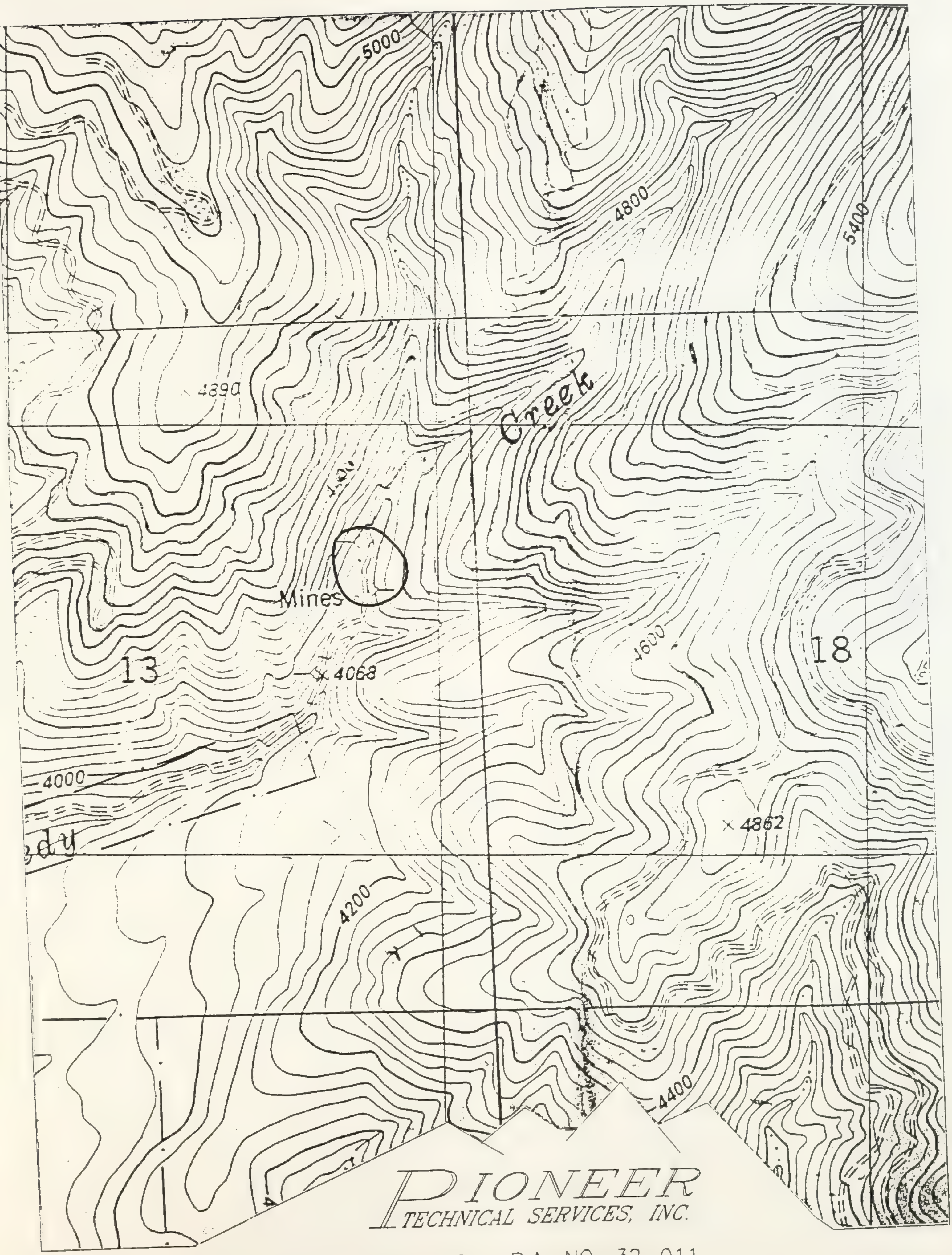
Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes_X_, No___, # _2_, Comment Both caved
Pits - Yes___, No_X_, # ____, Comment
Placers - Yes___, No_X_, # ____, Comment
Other - Yes___, No_X_, # ____, Comment

Mill Operation? Yes____, No_X_. If yes answer the next three questions:

Period(s) of Operation: N/A; shipped to Nancy Lee Mill

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

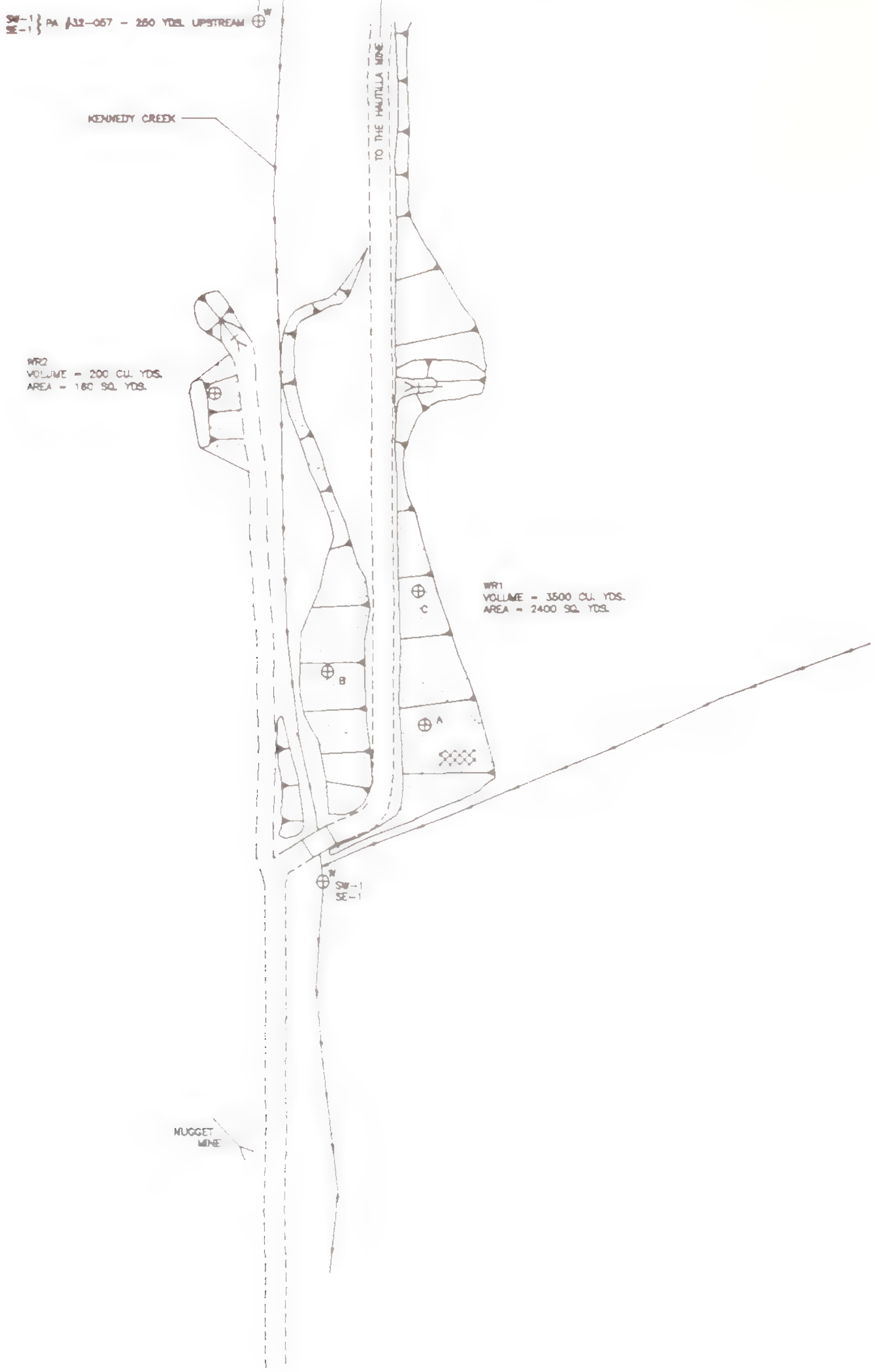
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

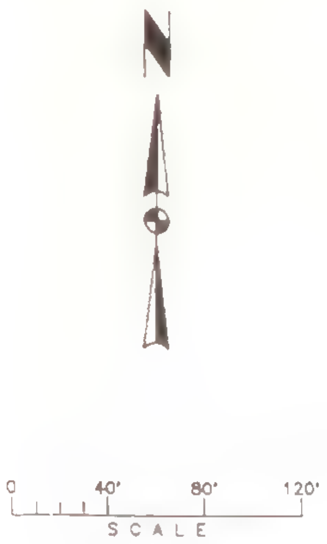


PIONEER
TECHNICAL SERVICES, INC.

LOST CABIN, P.A. NO. 32-011

T16N, R22W, SECTION 13
SCALE: 1" = 1000'





LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	✳	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	▩	UTILITY POLE
⧓	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
⬭	EXCAVATION	●	DECIDUOUS TREE
⬭	WASTE ROCK DUMP	●	CONIFEROUS TREE
⨯⨯⨯	COLLAPSED TIMBERS	—•—	WOOD FENCE
——	RAILS	•—•—•	WIRE FENCE
░	DUMP	▨	BUILDING
◕	SOIL SAMPLE	○	BARRIER POST
⊕	XRF SAMPLE	⌒	GATE
⊕	WATER SAMPLE GROUND AND SURFACE	— · —	EDGE OF ASPHALT
—•—•—	DRAINAGE	— — —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION
		≡	PONDED WATER

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MEE DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LOST CABIN PA# 32-011
NINEMILE DISTRICT MISSOULA COUNTY

SHEET NO.

32-011.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,500	South end of WR-1, north of timber pile	None	6.10	0.04	32-011-WR-1	07/02/93 1230	T-Metals, ABA
WR-1B	WR		On east bank of Kennedy Creek near center of WR-1	None	6.65	0.04			
WR-1C	WR		North end of site	None	6.85	0.04			
WR-2	WR	200	On west bank of Kennedy Creek, north end of site	None	6.80	0.04			
SS-1	BKGRND	N/A	Background soil west of collapsed adit on west bank of Kennedy Creek	N/A	N/A	0.04	32-011-SS-1	07/02/93 1115	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-011-WR-1 is composite of WR-1A through -1C, and WR-2.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 0

Distance to nearest well used for drinking? Approx. 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
No groundwater apparent in adits; metal values in dumps are elevated, sc groundwater could be in contact with metal bearing rocks or impacted by leaching from the waste material.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Kennedy Creek flows south through site; unnamed tributary flows west along southern edge of site.

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1 and -2 both border Kennedy Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1.3 during investigation
High Flow: 10 cfs , Average Flow: 1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; WR-1 and -2 both have their base in Kennedy Creek.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: WR-1 and -2 both have their base in Kennedy Creek.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering, possible residential, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	20' below bridge also below confluence of unnamed tributary	6.06	99.4	148	7.7	28	1.31 cfs (M)	32-011-SW-1	07/02/93 1045	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	20' below bridge also below confluence of unnamed tributary	N/A	N/A	N/A	N/A	N/A	N/A	32-011-SE-1	07/02/93 1045	T-Metals
SW-1	SW	Downgradient of Hautilla Mine (upgradient of Lost Cabin)	6.64	83.5	107	7.3	20	0.42 cfs (M)	32-057-SW-1	07/02/93 0915	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient of Hautilla Mine (upgradient of Lost Cabin)	N/A	N/A	N/A	N/A	N/A	N/A	32-057-SE-1	07/02/93 0915	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Mine site area only, narrow; moderately steep canyon in this area.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/2 mile, possibly recreational

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Dry	21,600	21,600	No	None
WR-2	FEOX	Dry	1,440	720	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe:_______
Campfire ring

Accessibility - Fences, warning signs, closed roads? "No Trespassing" signs and unlocked gate are present below the Nugget mine.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________________
Wilderness Area - Yes___, No_X_, Comment__________________
T&E Species Habitat - Yes___, No_X_, Comment__________________
Bat Habitat - Yes___, No_X_, Comment__________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Bridge at site is unreliable for vehicle travel.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_2_, types and locations: WR-1 and -2 both have slopes just at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:_______________

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lost Cabin, Prepared by Northern Engineering and Testing, September 19, 1988.

USGS, Topographic Map, McCormick Peak, Montana, 7 1/2 minute Quadrangle, 1984.

LABORATORY ANALYTICAL DATA

LOST CABIN MINE
PA NO. 32-011

Lost Cabin PA# 32-011
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-011-SE-1	26 J	43.6 JX	0.6 U	10.1 JX	5.4	177 JX	24300	0.199 J	548 J	16	346	7 U	293 J	NR
32-057-SE-1	11 J	41.8 JX	0.6 U	6.1 JX	5.4	37.1 JX	15500	0.025 J	298 J	11	17	7 U	56 J	NR
32-011-WR-1	98 J	17.2 JX	1.2	7.8 JX	4.3	1150 JX	21700	0.318 J	398 J	11	3370	8	478 J	NR
BACKGROUND	14 J	689 JX	0.8	7 JX	3.9	17.8 JX	13100	0.1 J	3380 J	16	43	6	329 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-011-WR-1	0.21	6.56	3.29	−3.2	0.08	0.01	0.12	0.31	2.98

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32-011-SW-1	1.49 U	4.27 JX	2.57 U	9.7 U	6.83 U	7.73 J	31	0.056 J	4.08 U	12.7 U	2.24 J	30.7 U	37.7 J	23
32-057-SW-1	1.81	2.13 JX	2.57 U	9.7 U	6.83 U	2.63 J	36.1	0.097 J	4.08 U	12.7 U	1.29 J	30.7 U	19.9 J	20.3

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
32-011-SW-1	93	< 5.0	< 5	< 0.05	NR
32-057-SW-1	49	< 5.0	< 5	< 0.05	NR

LEGEND

32-011-SE1 – 20' below bridge, also below confluence of unnamed tributary.
32-057-SE1 – Downgradient of Hautilla mine, upgradient for Lost Cabin.
WR1 – Composite of subsamples WR1A, 1B, 1C, and 2.
BACKGROUND – From the Lost Cabin Mine (32-001-SS-1).
SW1 – Same as sample 32-011-SE-1.
SW2 – Same as sample 32-057-SE-1.

XRF ANALYSIS RESULTS

LOST CABIN MINE
PA NO. 32-011

MDSL AMRB/PIONEER 4/9/93

Mine Name: Lost Cabin PA# 32-011
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-011-WR1-A		40766.7	1146.45	2052.07			16431.6		326.559	183.766		38.9502
32-011-WR1-B		30357.5	1335.07	1217.15	144.066 *		34157.8		303.458	188.204		27.7769
32-011-WR1-C		45816.2	1889.27	1654.53			25417.2		480.686	235.204	104.742	42.3117
32-011-WR-1-COMP		35324.6	1534.49	1492.31	171.489 *	224.474 *	29653.3		511.454	280.181		39.5635
32-011-WR-2		40475.7	2902.63	1554.84		833.553 *	28103.3	225.736 *	1027.81	514.003		53.2004

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-011-WR1-A	149.45			3895.11	149.74			227.653			
32-011-WR1-B	174.081			483.277	187.96			271.76			10.2394 *
32-011-WR1-C	218.881			128.315	256.496			420.758		11.1957 *	19.5535
32-011-WR-1-COMP	191.33			1785.13	198.508		54.581 *	316.716	353.783 *		13.6493 *
32-011-WR-2	242.604			2285.39	221.812			432.705			17.4226 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LOST CABIN
PA NO. 32-011

AIMSS SCORESHEET

SITE NAME: LOST CABIN MINE
PA NUMBER: 32-011

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	10.243
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.302
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	152577
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.377
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1697
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.341
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	8
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	409
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1.55**

			SITE NAME:	LOST CABIN MINE
LINE NO.			PA NUMBER:	32-011
		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	40
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	8
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**3.20**

32-011, #16: Collapsed adit on east bank

32-011, #17: WR-1; WR-1B stake (foreground) and WR-1C stake (background)

32-011, #18: SW-1 and SE-1 sample locations 20' below bridge and confluence of unnamed tributary

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NUGGET MINE **PA#:** 32-042

Date: July 2, 1993 **Time:** 1200

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: Babits, Pierson, Lasher; Pioneer

Weather/Seasonality Observations: Rainy, constant drizzle; 55°F.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #19: Adit #1, GW-1 sample location; #20: WR-1 and settling pond, west side of Kennedy Creek; #21: WR-1 on east side of Kennedy Creek; #22: SW-1 sample location. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Study water treatment requirements and alternatives. Isolate waste material from stream. Grade, amend, and revegetate waste material.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NUGGET MINE PA#: 32-042

Legal Description: T 16N ;R 23W ;Sec. 13 , NW1/4 SE1/4 ___1/4

County: MISSOULA Mining District: NINE MILE

Latitude: N 47° 08' 50" Longitude: W 114° 26' 45"

Primary Drainage Basin and Code: Kennedy Creek/17010204
Secondary Drainage Basin: Kennedy Creek

USGS Quadrangle map name(s): McCormick Peak

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: In same rock type and sheer zone as Lost Cabin and Hautilla mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Pond was constructed for adit discharge although no treatment occurs.

General site features: Elevation 4100', Slope 10°-38°, Aspect East and West

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 1 acres.
Dimensions: 475 feet x 100 feet

Predominant vegetation types: Larch, Engelman spruce, hemlock, western red cedar, Ponderosa pine, cottonwoods, nine bark, alder

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). First on road that leads to Lost Cabin and Hautilla

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in the Kennedy Creek drainage. Kennedy Creek cuts the waste rock dumps and flows southwest away from the site. Site is underlain by a blue-black argillite and banded argillite.

Mining/milling history, ore type/tenor, host rock, gangue: Mineralization occurs in sheer zones within the host argillite. The shear zone contains sheared quartz with pyrite, chalcopyrite, galena, and sphalerite.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment

Adits - Yes X, No___, # 3, Comment 2 collapsed; 1 open

Pits - Yes___, No X, # ___, Comment

Placers - Yes___, No X, # ___, Comment

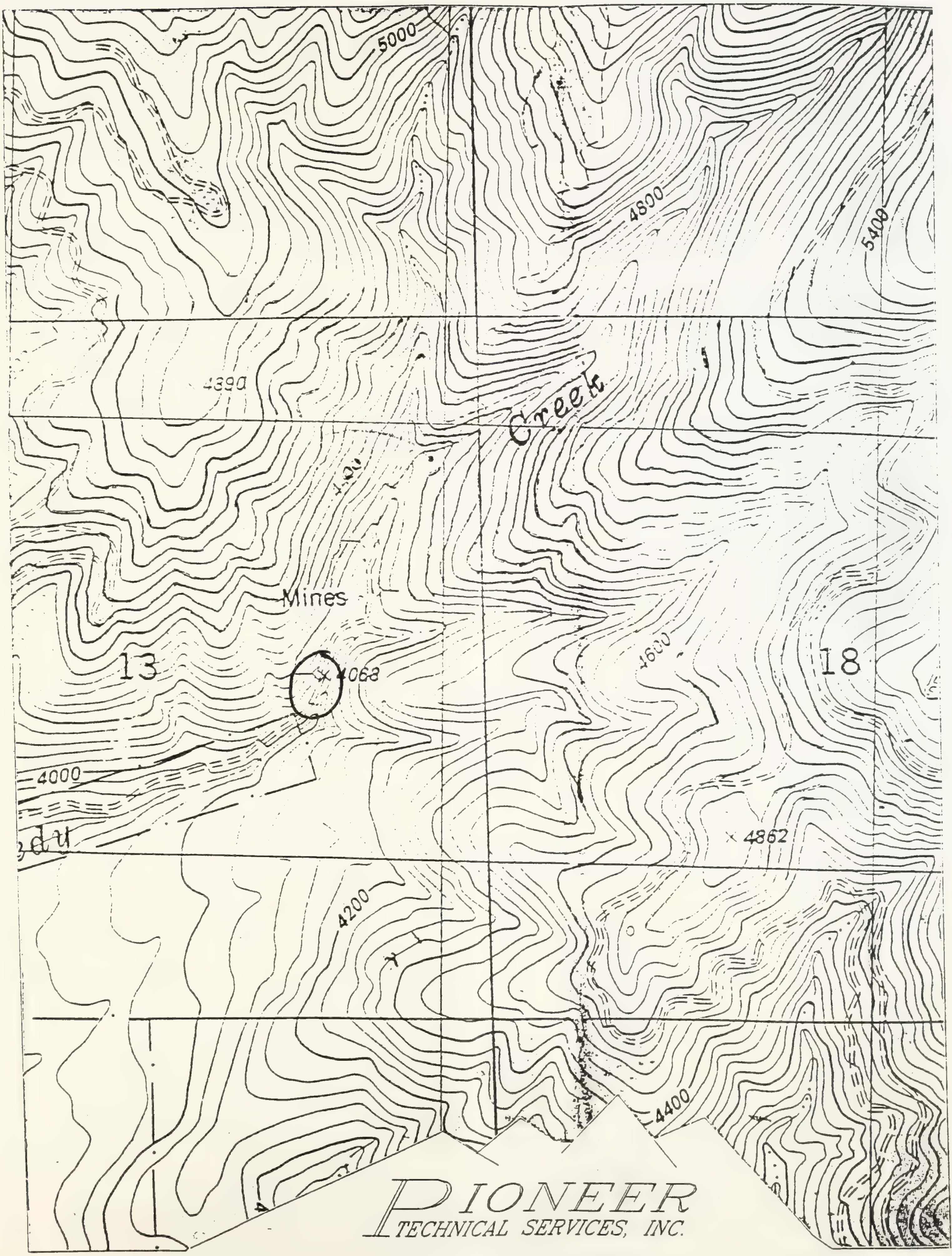
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

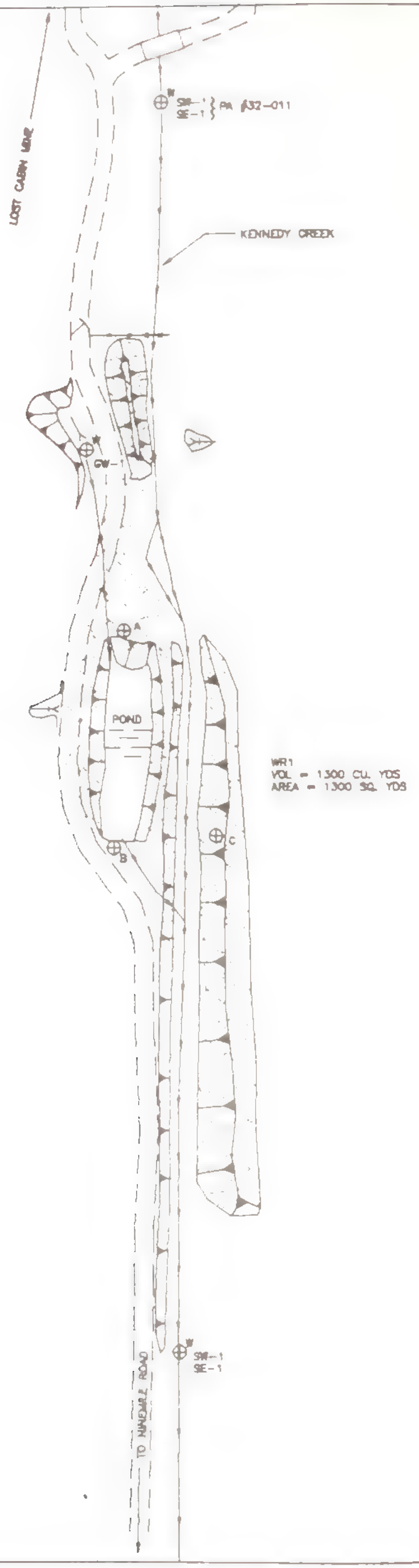
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

NUGGET, P.A. NO. 32-042

T16N, R23W, SECTION 13
SCALE: 1" = 1000'



NOT TO SCALE

LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	☀	LIGHT (LIGHT POLE)
☒	OPEN SHAFT	⊘	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
⬭	EXCAVATION	●	DECIDUOUS TREE
⬭	WASTE ROCK DUMP	✱	CONIFEROUS TREE
⨯⨯⨯	COLLAPSED TIMBERS	—•—•—	WOOD FENCE
—+—	RAILS	-•-•-•-	WIRE FENCE
░	DUMP	▨	BUILDING
◕	SOIL SAMPLE	○	BARRIER POST
⊕	XRF SAMPLE	⋀	GATE
⊕W	WATER SAMPLE GROUND AND SURFACE	-·-·-	EDGE OF ASPHALT
—•—•—	DRAINAGE	- - -	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION
		≡	PONDED WATER

32-042.DWG

SHEETS

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NUGGET MINE PA# 32-042
NINEMILE DISTRICT MISSOULA COUNTY

PIONEER
TECHNICAL SERVICES INC. BUTTE, MT.

DRAWN MEE DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS—BOZEMAN—KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,300	South of Adit #1, north of pond	None	6.95 (D)	0.04	32-042-WR-1	07/02/93 1330	T-Metals, ABA
WR-1B	WR		West side of Kennedy Crk., south end of pond	None	6.4 (D)	0.04			
WR-1C	WR		East side of Kennedy Crk., south end of pond	None	6.5 (D)	0.04			
WR-1D	WR		South end of site, east side of Kennedy Crk.	None	6.8 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-042-WR-1 is composite of WR-1A through -1D.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X , Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X , Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 51

Distance to nearest well used for drinking? Approx. 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible X , Unlikely ___.
pH is neutral; Lead values in dump are elevated. Groundwater could be in contact with metal bearing waste rock.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Right at mouth of Adit #1	0.003 cfs (M)	7.09	108.6	N/A	12.5	50	N/A	32-042-GW-1	07/02/93 1320	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): pH meter was broken; no Eh measurement taken.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Kennedy Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Settling pond for adit discharge

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1 during investigation
High Flow: 10 cfs , Average Flow: 1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; WR-1 is on both sides of Kennedy Creek. Settling pond is also constructed from by WR-1. Adit discharge runs over WR-1 as does settling pond discharge.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: See above

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetland, fishery, irrigation, stock watering, possible residential use

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
WR-1 is actively eroding, but impacted area is limited to the bounds of the site.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downstream of site	7.39	110.8	240	6.8	27	0.869 cfs (M)	32-042-SW-1	07/02/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downstream of site	N/A	N/A	N/A	N/A	N/A	N/A	32-042-SE-1	07/02/93 1300	T-Metals
SP-1	SW	At discharge from pond	7.29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Field Parameters
SW-1	SW	20 feet below bridge below Lost Cabin	6.06	99.4	148	7.7	28	1.313 cfs (M)	32-011-SW-1	07/02/93 1045	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SW	20 feet below bridge below Lost Cabin	N/A	N/A	N/A	N/A	N/A	N/A	32-011-SE-1	07/02/93 1045	T-Metals
SE-500	SE	500 feet downgradient of SW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-1000	SE	1,000 feet downgradient of SW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1 acre of mine site.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1/2 mile, possibly recreational

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Partial	11,700	8,800	Yes	Low
Adit #1	Algae	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer and pop cans; flagging; campfire rings

Accessibility - Fences, warning signs, closed roads? "No Trespassing" sign on adit portal.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes_X_, No___, Comment Open adit

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit #1

Hazardous structures: Yes___, No_X_, Number____, types and locations:______

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_2_, types and locations: On west side of Kennedy Crk., WR-1 is being undercut. WR-1 on east side is at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Nugget Mine, Missoula County, Form 39, 1975-1988.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Nugget, Prepared by Northern Engineering and Testing, September 13, 1988.

USGS, Topographic Map, McCormick Peak, Montana, 7 1/2 minute Quadrangle, 1984.

LABORATORY ANALYTICAL DATA

NUGGET MINE
PA NO. 32-042

Nugget PA# 32-042
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-042-SE-1	32 J	17.6 JX	0.4 U	4.6 JX	2	642 JX	12400	0.015 J	238 J	7	227	5 U	301 J	NR
32-011-SE-1	26 J	43.6 JX	0.6 U	10.1 JX	5.4	177 JX	24300	0.199 J	548 J	16	346	7 U	293 J	
32-042-WR-1	150 J	10.1 JX	0.5 U	4 JX	1.3 U	378 JX	21600	0.196 J	143 J	9	2340	11	330 J	NR
BACKGROUND	14 J	689 JX	0.8	7 JX	3.9	17.8 JX	13100	0.1 J	3380 J	16	43	6	329 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-042-WR-1	0.24	7.5	3.65	-3.9	0.19	<0.01	0.06	0	3.65

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32-042-GW-1	2.63	7.23 JX	2.57 U	9.7 U	6.83 U	38.6 J	377	0.096 J	88.1	12.7 U	6.1 J	30.7 U	1370 J	33
32-042-SW-1	1.49 U	4.03 JX	2.57 U	9.7 U	6.83 U	6.7 J	25.8	0.071 J	4.08 U	12.7 U	1.67 J	30.7 U	60.1 J	23.2
32-011-SW-1	1.49 U	4.27 JX	2.57 U	9.7 U	6.83 U	7.73 J	31	0.056 J	4.08 U	12.7 U	2.24 J	30.7 U	37.7 J	23

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
32-042-GW-1	76	< 5.0	9	< 0.05	NR
32-042-SW-1	63	< 5.0	< 5	< 0.05	NR
32-057-SW-1	49	< 5.0	< 5	< 0.05	NR

LEGEND

32-042-SE1 - Downstream of site.
32-011-SE1 - 20' below bridge, below Lost Cabin Mine.
WR1 - Composite of subsamples WR1A, 1B, 1C, and 1D.
BACKGROUND - From the Lost Cabin Mine (32-011-SS-1).

GW1 - At mouth of adit #1.
32-042-SW1 - Same as corresponding SE1 sample.
32-011-SW1 - Same as corresponding SE1 sample.

XRF ANALYSIS RESULTS

NUGGET MINE
PA NO. 32-042

Mine Name: Nugget PA# 32-042
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-042-SE-1000		27578.8	1701.48	1242.15		287.721 *	20691		120.957	396.829		44.7938
32-042-SE-500	255.979 *	30196.4	2424	1817.19		386.6 *	23431.3	191.919 *	129.527	407.633		56.3309
32-042-WR1-A		32143.3	2353.14	1474.42		573.162 *	27316.9		44.3445 *	193.326	28.124 *	54.2575
32-042-WR1-B		49001.7	1637.85	2258.14			32140.5		428.05	232.914		54.3799
32-042-WR1-C		35487.1	1353.83	1601.65			23418.4		506.489	356.184		30.7185
32-042-WR1-D		37545.9	1416.28	1776.9			24827.8		184.987	235.209	54.7661 *	25.3739
32-042-WR-1-COMP		37314.2	1259.29	1693.89			23449.8		235.204	186.818		37.4439

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-042-SE-1000	166.203			153.03	139.679			392.342			14.6225 *
32-042-SE-500	184.696			276.732	155.707			423.306		10.9484 *	14.3926 *
32-042-WR1-A	227.963			37.9236 *	200.21		55.507 *	447.541			19.9453
32-042-WR1-B	202.84			3048.62	239.274		93.4243 *	373.034	464.53 *		12.6626 *
32-042-WR1-C	155.263			2844.25	166.834		66.5513 *	254.983	325.99 *		11.3517 *
32-042-WR1-D	189.625			771.823	196.461			313.177			10.5335 *
32-042-WR-1-COMP	187.699			1273.82	179.353		56.8717 *	343.087	374.801 *		18.1617 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NUGGET
PA NO. 32-042

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: NUGGET MINE
PA NUMBER: 32-042

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.538
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		51
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	51.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	51775
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.780
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	37530
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.027
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	122
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.024
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 THRU 42	16
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	58
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.89**

SITE NAME: NUGGET MINE
PA NUMBER: 32-042

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	16
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**8.00**

32-042, #19: Adit #1 with discharge and Kennedy Creek (right); GW-1 taken at adit mouth

32-042, #20: Settling pond for discharge from adit, facing south; west side on Kennedy Creek

32-042, #21: WR-1, facing east towards WR-1D; east side of Kennedy Creek

32-042, #22: SW-1 and SE-1 sample locations downgradient of Nugget site

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: HAUTILLA PA#: 32-057

Date: July 2, 1993 Time: 0830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Constant drizzle; 55°F; calm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #11: Adit #1, collapsed; #12: Cabin on the site; #13: WR-1B; #14: SW-2 location upgradient; #15: SW-1 location downgradient. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Highwall reduction; revegetate dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HAUTILLA PA#: 32-057

Legal Description: T 16N ;R 23W ;Sec. 13 , NE1/4 NE1/4 ___1/4

County: MISSOULA Mining District: NINE MILE

Latitude: N 47° 09' 08" Longitude: W 114° 26' 30"

Primary Drainage Basin and Code: Kennedy Creek/17010204
Secondary Drainage Basin: Kennedy Creek

USGS Quadrangle map name(s): McCormick Peak

Mine Type/Commodities: Hardrock/Copper, Silver, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: In same host rock and shear zone as Lost Cabin and Nugget mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4300', Slope 10°-25°, Aspect Northern

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.45 acres.
Dimensions: 200 feet x 100 feet

Predominant vegetation types: Larch, Engelman spruce, hemlock, western red cedar, Ponderosa pine, cottonwood, nine bark, alder

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Lost Cabin and Nugget mines on same road

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by massive bluish-gray argillite. Site lies on perennial Kennedy Creek which flows southwest adjacent to the site.

Mining/milling history, ore type/tenor, host rock, gangue: Host rock is massive bluish-gray banded argillite. Vein of argillite with seams of quartz and chalcopyrite partly oxidized near surface to malachite and azurite. Three shipments of ore made to Nancy Lee Mill and an assay of ore showed 0.01 oz. Au, 0.83 oz. Ag, 6.94% Cu, 0.01% Zn, and no lead.

Mine Operation?

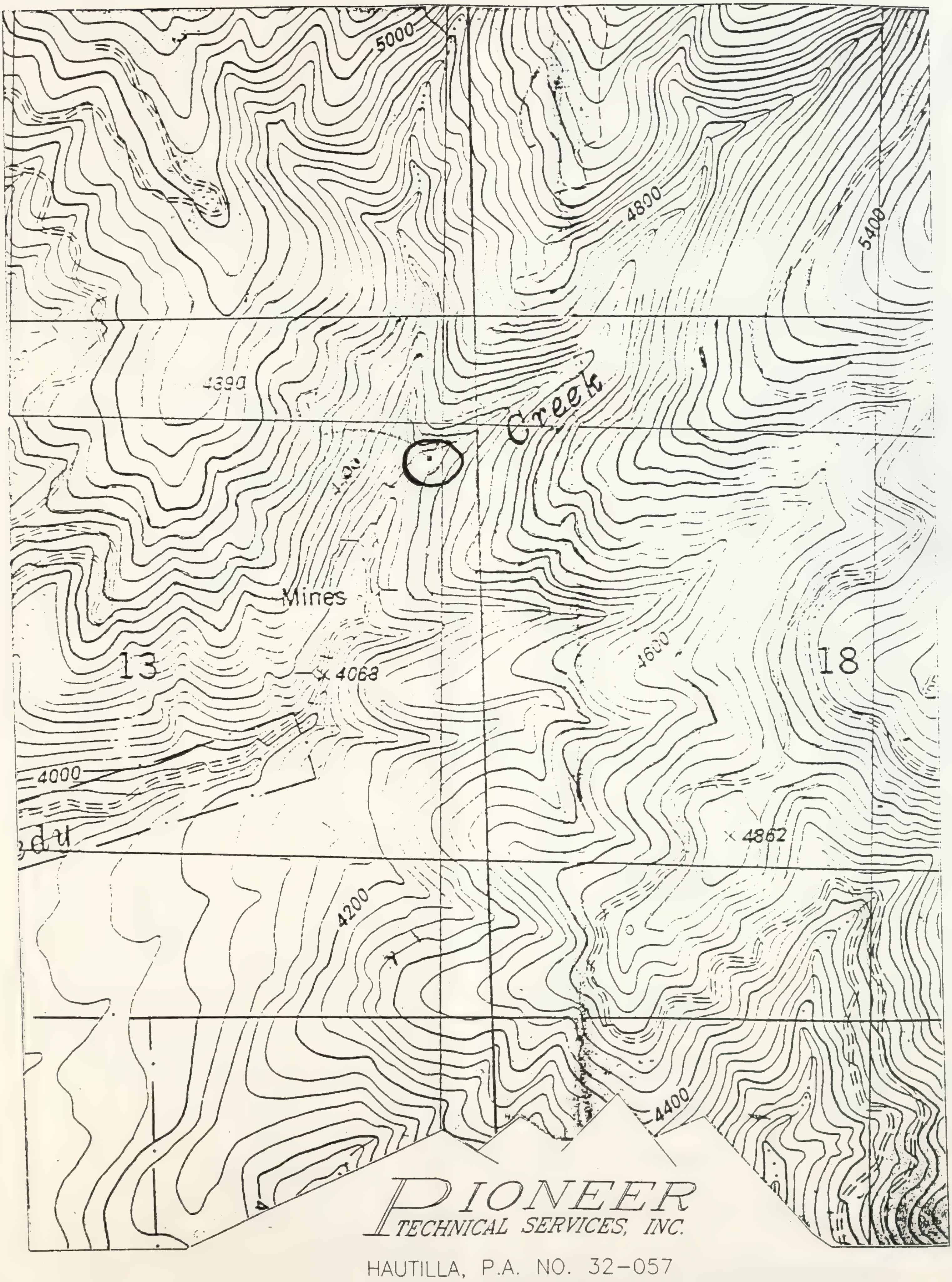
Shafts -	**Yes** ___	**No** X	**#** ___	**Comment**
Adits -	**Yes** X	**No** ___	**#** 2	**Comment** Collapsed
Pits -	**Yes** ___	**No** X	**#** ___	**Comment**
Placers -	**Yes** ___	**No** X	**#** ___	**Comment**
Other -	**Yes** ___	**No** X	**#** ___	**Comment**

Mill Operation? Yes ___, **No** X. **If yes answer the next three questions:**

Period(s) of Operation: N/A; shipped to Nancy Lee Mill - Slowey (PA# 31-090)

Origin of Ore Milled - Custom Mill ___ **Dedicated Mill** ___; **Number and names of mines that supplied mill feed:** N/A

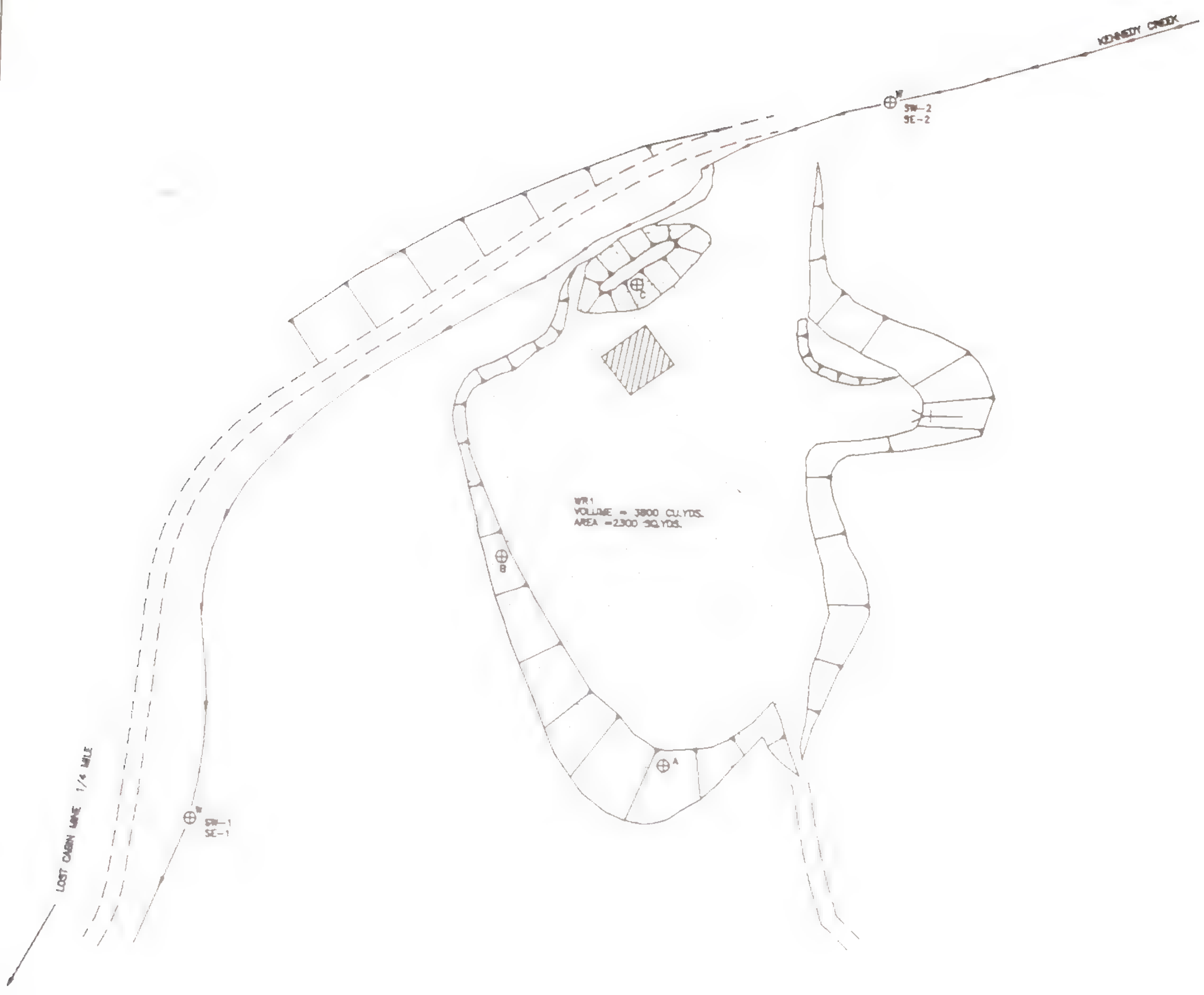
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

HAUTILLA, P.A. NO. 32-057

T16N, R23W, SECTION 13
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	☀	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	⌀	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
⬭	EXCAVATION	●	DECIDUOUS TREE
⬭	WASTE ROCK DUMP	✱	CONIFEROUS TREE
⨯⨯⨯	COLLAPSED TIMBERS	—•—	WOOD FENCE
—•—	RAILS	-•-•-•-	WIRE FENCE
⁘	DUMP	▨	BUILDING
◕	SOIL SAMPLE	○	BARRIER POST
⊕	XRF SAMPLE	⋏	GATE
⊕W	WATER SAMPLE GROUND AND SURFACE	—·—·—	EDGE OF ASPHALT
—◆—	DRAINAGE	— — —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION
		≡	PONDED WATER

DRAWN MEE DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

HAUTILLA PA# 32-057
NINEMILE DISTRICT MISSOULA COUNTY

SHEET NO.

32-057.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,800	West end of WR-1	None	7.0 (D)	0.04	32-057-WR-1	07/02/93 1230	T-Metals, ABA
WR-1B	WR		West side of cabin, north side of dump	None	6.5 (D)	0.05			
WR-1C	WR		WR pile just east of cabin	None	6.7 (D)	0.05			

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-057-WR-1 is composite of WR-1A through -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 34

Distance to nearest well used for drinking? Approx. 2.25 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Metal values are only slightly elevated in dumps. Minimal chance of groundwater contact with the waste material.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Kennedy Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1 is on bank of Kennedy Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.5 during investigation
High Flow: 10 cfs , Average Flow: 0.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; WR-1 borders Kennedy Creek.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: See above

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering, possible residential, fishery, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient of site	6.64	83.5	107	7.3	20	0.42 cfs (M)	32-057-SW-1	07/02/93 0915	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient of site	N/A	N/A	N/A	N/A	N/A	N/A	32-057-SE-1	07/02/93 0915	T-Metals
SW-2	SW	Upgradient of site	6.37	87.3	138	7.3	20	0.60 cfs (M)	32-057-SW-2	07/02/93 0930	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient of site	N/A	N/A	N/A	N/A	N/A	N/A	32-057-SE-2	07/02/93 0930	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

MDSL AMRB/PIONEER 4/9/93

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Only mine site available, 0.45 acres; meadow approx. 200 feet below the mine is approx. 3 acres.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 3/4 mile downstream

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Dry	20,700	10,350	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:______________________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments______________________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_Fresh
candy bar wrappers; campfire ring

Accessibility - Fences, warning signs, closed roads?_Gate 0.5 mile
below mine; need to walk approx. 1/4 mile on overgrown road.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Cabin

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Wooden structur

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Hautilla, Prepared by Northern Engineering and Testing, September 20, 1988.

USGS, Topographic Map, McCormick Peak, Montana, 1/2 minute Quadrangle, 1984.

LABORATORY ANALYTICAL DATA

HAUTILLA
PA NO. 32-057

Hautilla PA# 32–057
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32–057–SE–1	11 J	41.8 JX	0.6 U	6.1 JX	5.4	37.1 JX	15500	0.025 J	298 J	11	17	7 U	56 J	NR
32–057–SE–2	6 U	36.7 JX	0.6 U	4.2 JX	2.1	11 JX	13200	0.106 J	288 J	10	9 U	7 U	34 J	NR
32–057–WR–1	24 J	42.4 JX	0.5 U	19.1 JX	1.3 U	530 JX	9180	0.056 J	577 J	14	34	6 U	122 J	NR
BACKGROUND	14 J	689 JX	0.8	7 JX	3.9	17.8 JX	13100	0.1 J	3380 J	16	43	6	329 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32–057–WR–1	0.02	0.62	5.2	4.57	<0.01	<0.01	0.03	0	5.2

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32–057–SW–1	1.81	2.13 JX	2.57 U	9.7 U	6.83 U	2.63 J	36.1	0.097 J	4.08 U	12.7 U	1.29 J	30.7 U	19.9 J	20.3
32–057–SW–2	2.25	3.87 JX	2.57 U	9.7 U	6.83 U	2.53 J	41.3	0.190 J	4.08 U	12.7 U	1.27 J	30.7 U	7.57 U	18.8

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
32–057–SW–1	49	< 5.0	< 5	< 0.05	NR
32–057–SW–2	63	< 5.0	< 5	< 0.05	NR

LEGEND

SE1 – Downgradient of site.
SE2 – Upgradient of site.
WR1 – Compsite of subsamples WR1A, 1B, and 1C.
BACKGROUND – From the Lost Cabin Mine (32–011–SS–1).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

HAUTILLA
PA NO. 32-057

Mine Name: Hautilla PA# 32-057
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-057-WR1-A		38873.1	3601.71	1956.33		1106.1	31307.2		652.479	174.568	31.8489 *	62.4243
32-057-WR1-B		34208	2404.22	2639.78		1201.84	32528.8		2829.02	306.063		37.5875
32-057-WR1-C	226.355 *	30335.6	3202.63	1899.78		1277.23	28652.9	207.24 *	442.182	119.183		69.5543
32-057-WR1-C-DUP	221.698 *	33943.9	3230.56	1983.85		1458.39	28414.3		401.015	100.46 *		70.1044
32-057-WR-1-COMP	213.878 *	30780	2335.08	1765.37		1064.81	27982.7		943.353	192.291	39.7443 *	46.8407

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-057-WR1-A	242.569			29.3351 *	210.895			487.122			20.5162
32-057-WR1-B	198.438		14.7105	39.7872 *	211.297			410.183	310.653 *		11.9903 *
32-057-WR1-C	235.364			67.7905	184.24			495.058	288.198 *		16.5307 *
32-057-WR1-C-DUP	232.545			54.807	201.779			530.031		9.09858 *	14.8579 *
32-057-WR-1-COMP	184.32			31.3178 *	188.713			416.28			14.3309 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

HAUTILLA
PA NO. 32-057

AIMSS SCORESHEET

SITE NAME: HAUTILLA
PA NUMBER: 32-057

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.030
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		34
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	34.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	408
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.045
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	567
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.01**

				SITE NAME:	HAUTILLA
LINE NO.		**SITE SAFETY**		PA NUMBER:	32-057
1	THREAT	ACCESSIBILITY			10
2		OPEN SHAFTS	100 EA.		0
3		OPEN ADITS	50 EA.		0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.		0
5		HAZ. STRUCTURES	40 EA.		40
6		EXPLOSIVES			0
7		HAZ. MATERIALS			0
8		HAZARDS SCORE	SUM LINES 2 THRU 7		40
9		POPULATION - 1 MILE			1
10	TARGETS	NEAREST RESIDENCE			0
11		RECREATIONAL USE			5
12		TARGETS SCORE	SUM LINES 9 THRU 11		6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000		**2.40**

32-057, #11: Adit #1 (collapsed)

32-057, #12: Cabin on site

32-057, #13: WR-1B

32-057, #14: SW-2 and SE-2 sample locations upgradient of site on Kennedy Creek

32-057, #15: SW-1 and SE-1 sample locations downgradient of site on Kennedy Creek

WOODMAN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: WARD LODE MINE PA#: 32-005

Date: September 8, 1993 Time: 0930-1230

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Clear; calm; cool (55°-60°F).

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #4: WR-1 looking south; #5: Open cut (former adit); #6: SW-1; #7: Settling pond; #8-#10: Aerial view of mine. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Vegetation volunteering on the waste rock included Lodgepole pine, Alder and Engleman spruce, and appear to be doing better than planted stock.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grading; soil amendment (if necessary); revegetation.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): WARD LODE MINE PA#: 32-005

Legal Description: T 11N ;R 22W ;Sec. 21 ,NE 1/4SE 1/4 ___ 1/4

County: MISSOULA Mining District: WOODMAN

Latitude: N 46° 41' 42" Longitude: W 114° 21' 40"

Primary Drainage Basin and Code: South Fork Lolo Creek/17010205
Secondary Drainage Basin: Dick Creek

USGS Quadrangle map name(s): Dick Creek

Mine Type/Commodities: Hardrock/Silver, Lead

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? USFS is in process of reclamation planning. Spring 1993 close on EA comment and decision review is beginning.

General site features: Elevation 6400', Slope 10°-35°, Aspect East

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 12 acres.
Dimensions: Site dimensions are approx. 780 feet x 650 feet.

Predominant vegetation types: Lodgepole pine, Engleman and Alder spruce

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Possible locked gate (unconfirmed).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on a hillside above and on the northwest side of perennial Dick Creek. Dick Creek lies approx. 1/2 mile below the site. The creek flows north and then northeast to confluence with South Fork Lolo Creek approx. 3 miles from the site.

Mining/milling history, ore type/tenor, host rock, gangue: Rocks at the mine are pegmatites, granites, schist, argillites. No other information available.

Mine Operation?

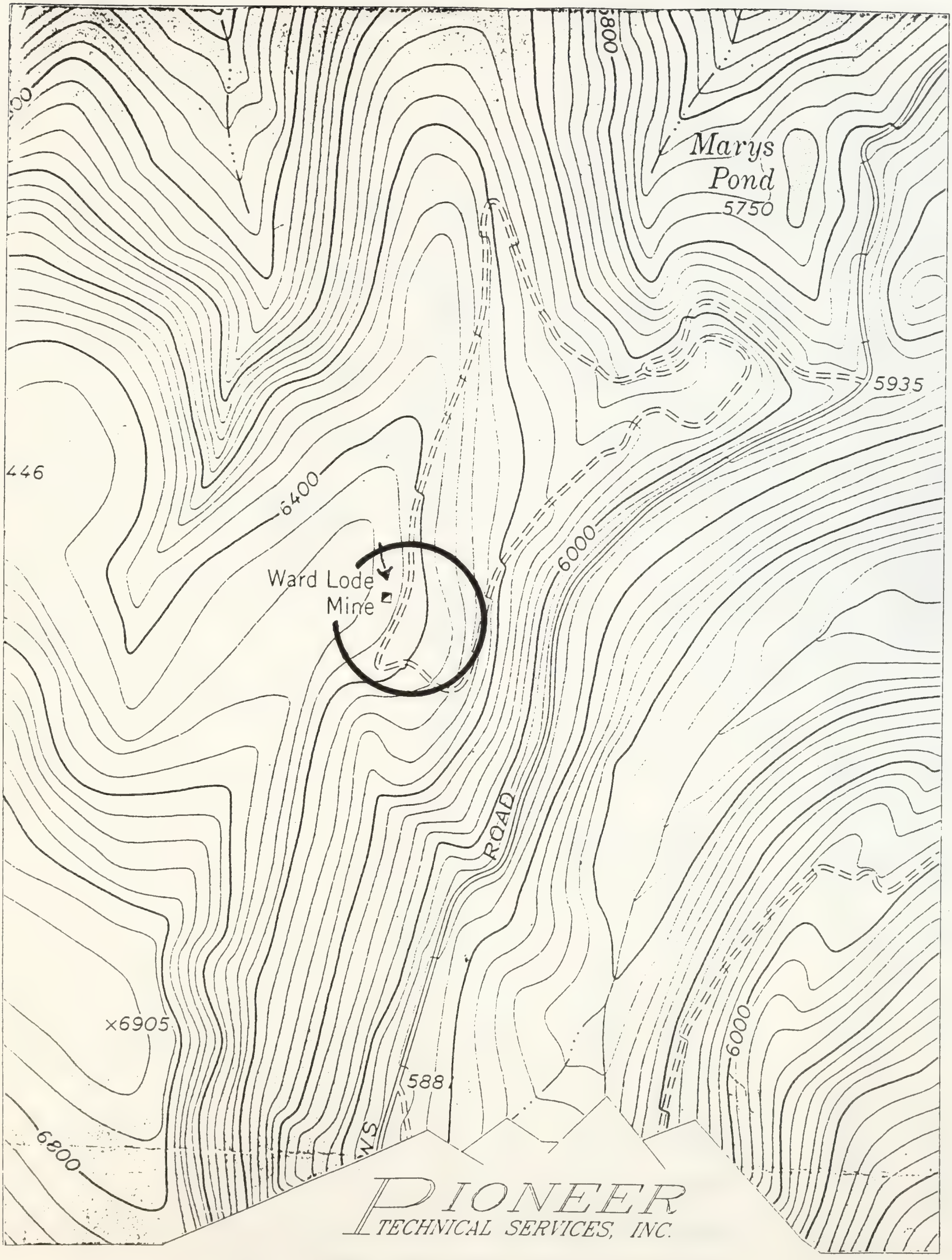
Shafts - Yes___, No X, # ___, Comment___
Adits - Yes X, No___, # 1, Comment Caved and mined out
Pits - Yes___, No X, # ___, Comment___
Placers - Yes___, No X, # ___, Comment___
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

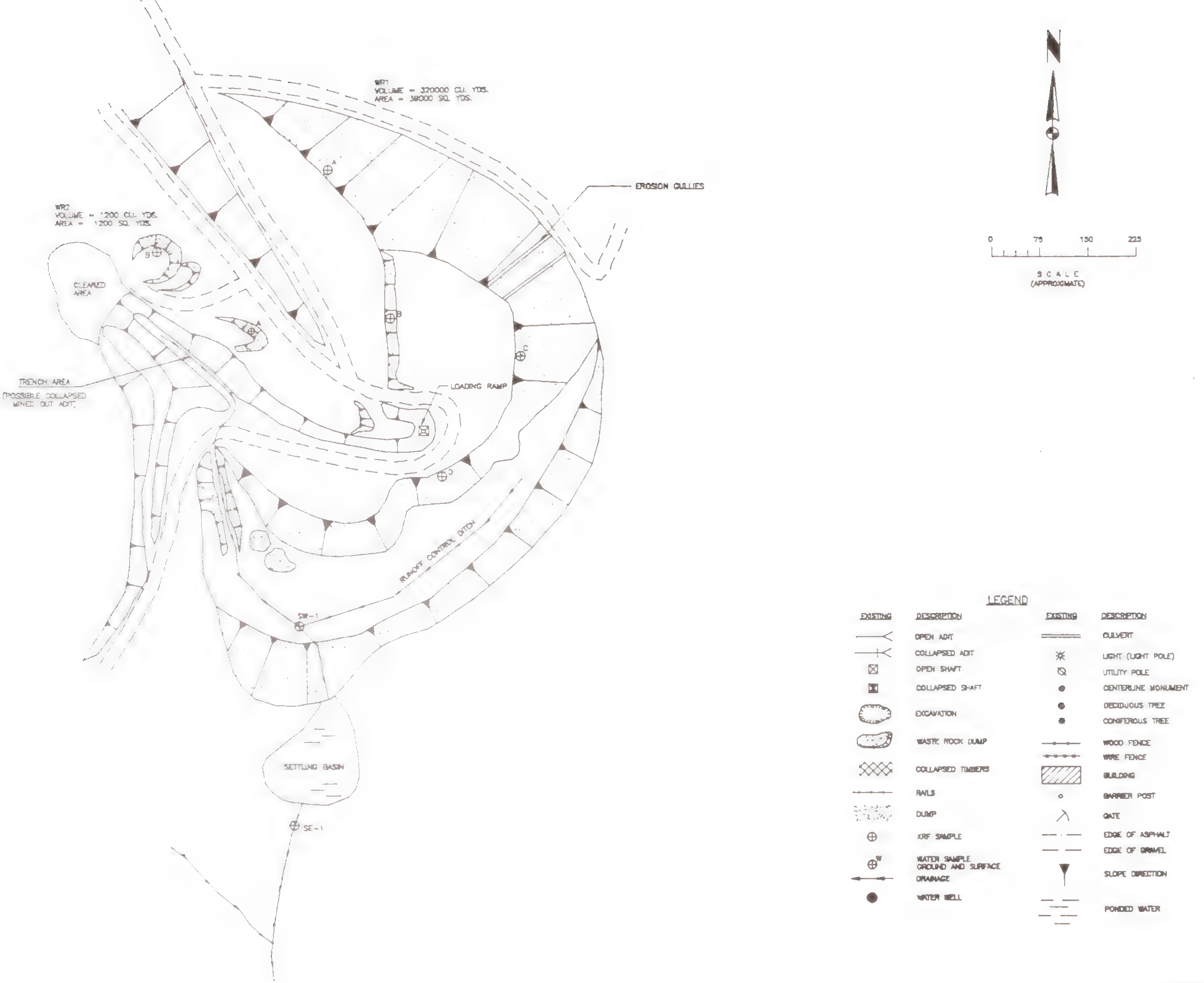
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



WARD LODE MINE, P.A. NO. 32–005

T11N, R22W, SECTION 21

SCALE: 1" = 1000'



DRAWN MEE DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

WARD LODE PA# 32-005
WOODMAN DISTRICT MISSOULA COUNTY

SHEET NO.

32-005.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	320,000	Northern end of large lower dump; brown silt	None	5.0 (D)	0.035	32-005-WR-1	09/08/93 1050	T-Metals, ABA
WR-1B	WR		East end of upper bench off lower dump; brown silt	None	5.7 (D)	0.035			
WR-1C	WR		East end of lower bench on lower dump; brown silt	None	5.8 (D)	0.04			
WR-1D	WR		South end of lower bench on lower dump; brown silt	None	5.2 (D)	0.04			
WR-2A	WR	1,200	Small upper dump south finger; gray/tan silt	None	4.8 (D)	0.045	32-005-WR-2	09/08/93 1055	T-Metals, ABA
WR-2B	WR		Small upper dump north finger; tan sandy silt	None	6.2 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-005-WR-1 is composite of WR-1A through -1D. 32-005-WR-2 is composite of WR-2A and -2B. Background sample was collected at the Mill Creek Mine.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number:____ Identification: Slight seepage from trench or possibly adit discharge.

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes___, No X , Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 5

Distance to nearest well used for drinking? 4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.

Other observations/notes: Seepage was not sampled at point it first appeared, but at point of leaving the dump in order to collect a worst-case sample (see Surface Water Table). Seepage was very low flow (< 1 gpm).

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Unnamed tributary

Other surface water: Yes X , No___, Name(s)/Description: Trench/Adit drainage flows through trench, over dump material into a small settling pond (full), and finally, into Dick Creek drainage.

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:________, Average Flow:________

Distance between waste source(s) and nearest surface water body (ft)? 50 feet

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Precipitation runs off waste rock and through the trench cut into the Dick Creek drainage.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands, irrigation, fishery, stock watering, possible domestic use

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Drainage below the settling pond is well vegetated with very limited sedimentation observed.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In trench ditch prior to entering settling pond	7.98	NM	285	NM	19	< 1 gpm (E)	32-005-SW-1	09/08/93 1015	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Below outlet of settling pond in drainage	N/A	N/A	N/A	N/A	N/A	0 gpm	32-005-SE-1	09/08/93 1215	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1/2 acre below the trench in the mine area; drainage below the mine is very steep.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Nearest residence(ft or miles)? 4 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	Low pH; SO3	Partial; mostly dry	351,000	315,900	Yes	Low
WR-2	Low pH; SO3	Dry	10,800	9,720	Yes	Low

Notes and Clarifications: Particle size is typically large enough for dust propagation; potential is low.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Litter; off-road vehicle tracks

Accessibility - Fences, warning signs, closed roads? Possible locked gate

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________________
Wilderness Area - Yes___, No X , Comment________________
T&E Species Habitat - Yes___, No X , Comment________________
Bat Habitat - Yes___, No X , Comment________________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 1 , types and locations: Highwall in trench is approx. 50 feet high.

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 1 , types and locations: WR-1 is oversteepened with eroding side walls.

Fire and/or Explosion hazards: Yes___, No X , Explain:________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Ward Lode mine, Prepared by Northern Engineering and Testing, September 26, 1988.

USFS, Lolo National Forest Quarterly Project List, Spring 1993.

USGS, Topographic Map, Dick Creek, Montana, 7 1/2 minute Quadrangle, 1964.

LABORATORY ANALYTICAL DATA

WARD LODE
PA NO. 32-005

Ward Lode Mine PA# 32-005
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER-BULLOCK
INVESTIGATION DATE: 09/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	Cyanide (mg/Kg)
32-005-SE-1	39.2 J	190	1.8	3.47	7.24	11	5680	0.031 U	638	9.2	104	6.96 UJ	385 J	NR
32-005-WR-1	68.3	618 J	2.5	8.78 J	55.2	70.5 J	21900	0.061	1750 J	55.5	590	5.27 UJ	1990	NR
32-005-WR-2	89.8	806 J	12.1	7.97 J	86.9	77.9 J	26700	0.036	2790 J	79.1	588	9.36 J	7660	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	TOTAL SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	PYRITIC SULFUR ACID BASE POTENT. t/1000t
32-005-WR-1	0.04	1.25	7.29	6.04	<0.01	0.03	0.01	0.94	6.36
32-005-WR-2	0.62	19.4	32.5	13.1	0.13	0.15	0.34	4.69	27.8
32-005-WR-2DUP	0.61	19.1	32.6	13.6	0.13	0.15	0.33	4.69	28

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
32-005-SW-1	3.34	81.7	2.9 J	9.7 U	6.83 U	10.3 J	238	0.12 UJX	77.1	12.7 UX	12.8	30.7 U	243 J	6.8

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	TOTAL CYANIDE
32-005-SW-1	65	< 5.0	< 5.0	< 0.05	NR

LEGEND

SE1 - Below outlet of settling pond in drainage.
WR1 - Composite of subsamples WR1A through 1D.
WR2 - Composite of subsamples WR2A and 2B.
BACKGROUND - From the Mill Creek Mine (32-049-SS-1).
WR2DUP - Duplicate of the 32-005-WR-2 sample.
SW1 - In trench prior to entering settling pond.

XRF ANALYSIS RESULTS

WARD LODE
PA NO. 32-005

Mine Name: Ward Lode PA# 32-005
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-005-WR1-A	341.699 *	20990.4	6068.06	2973.15		1618.17	27404.9	286.369 *	87.202 *	1940.35		131.822
32-005-WR1-B	289	21029	6237	3078	148 *	1747	28252 $		92	2463 $		135
32-005-WR1-C		16760.2	5632.55	1827.87	167.921 *	999.486	19158.2			919.751		171.153
32-005-WR1-D		21260.3	6458.53	2385.5		3073.16	24596.9		58.907 *	1527.21		158.356
32-005-WR2-A	393.956 *	22332.5	10777.8	2610.4	201.656 *	4869.41	34947.7		145.294 *	7231.9	122.088 *	33.3396
32-005-WR2-B		18262	4703.1	2947.54		1455.53	22742.2		51.8563 *	1938.54		86.9194
32-005-WR-1-COMP		18647.2	5637.99	2203.71		1456.51	24389.5		68.9553 *	1605.03		148.356
32-005-WR-2-COMP	292.44 *	19211.1	7039.19	3302.38		2961.44	29267.3			4314.5		73.8326

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-005-WR1-A	185.032			402.364	153.853			1128.71			13.9072 *
32-005-WR1-B	170	26 *		687	164 $		21 *	1402	43 *	10 *	13 $
32-005-WR1-C	143.266			162.265	142.387			697.034			11.618 *
32-005-WR1-D	169.421			300.028	130.671			673.5		11.1923 *	13.6307 *
32-005-WR2-A	153.958		4.80408 *	694.429	176.819			2152.13	121.061 *		14.7431 *
32-005-WR2-B	167.559			337.368	154.419			639.787		13.8292 *	11.5968 *
32-005-WR-1-COMP	160.571			385.206	146.945			761.627			12.8041 *
32-005-WR-2-COMP	171.77			507.927	173.481			1168.48			17.2833 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

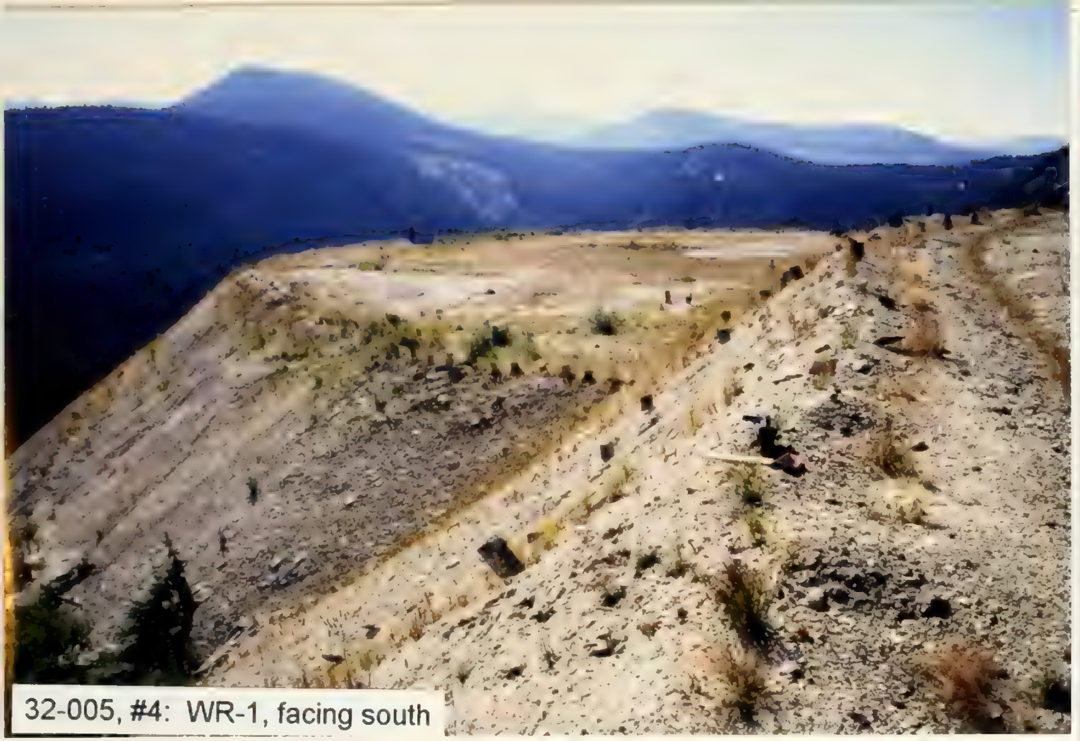
WARD LODE
PA NO. 32-005

AIMSS SCORESHEET

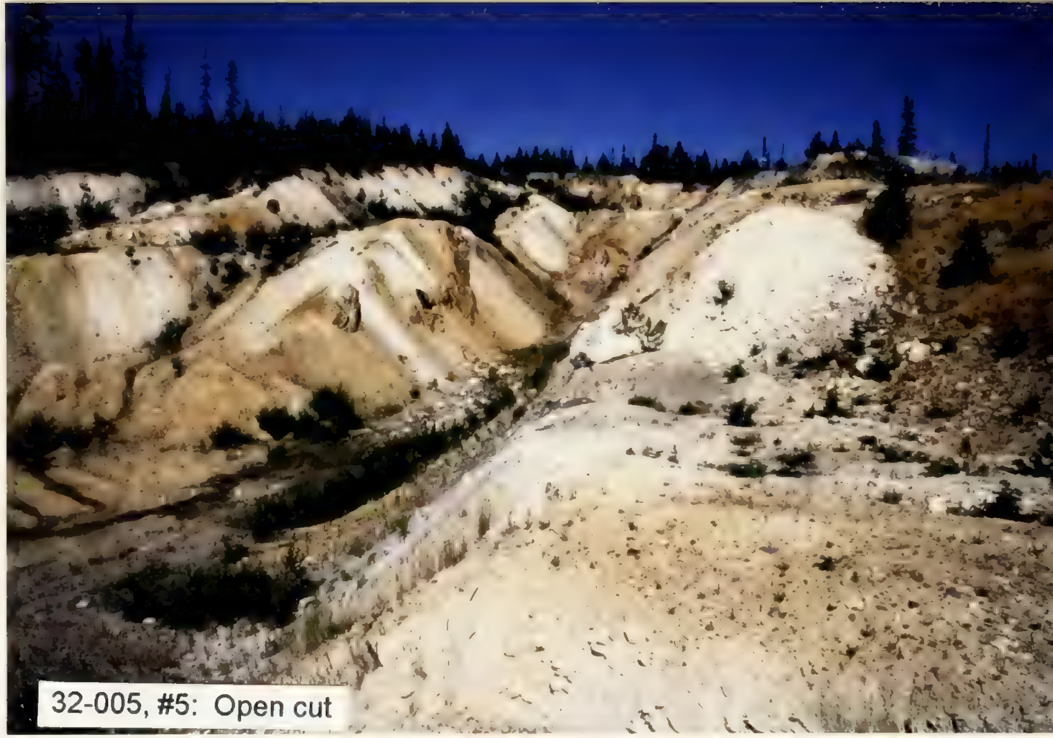
SITE NAME: WARD LODE MINE
PA NUMBER: 32-005

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	220.820
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		5
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	441640
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	250
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	242.422
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1030294
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.814
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	41
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.742
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	148
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**14.72**

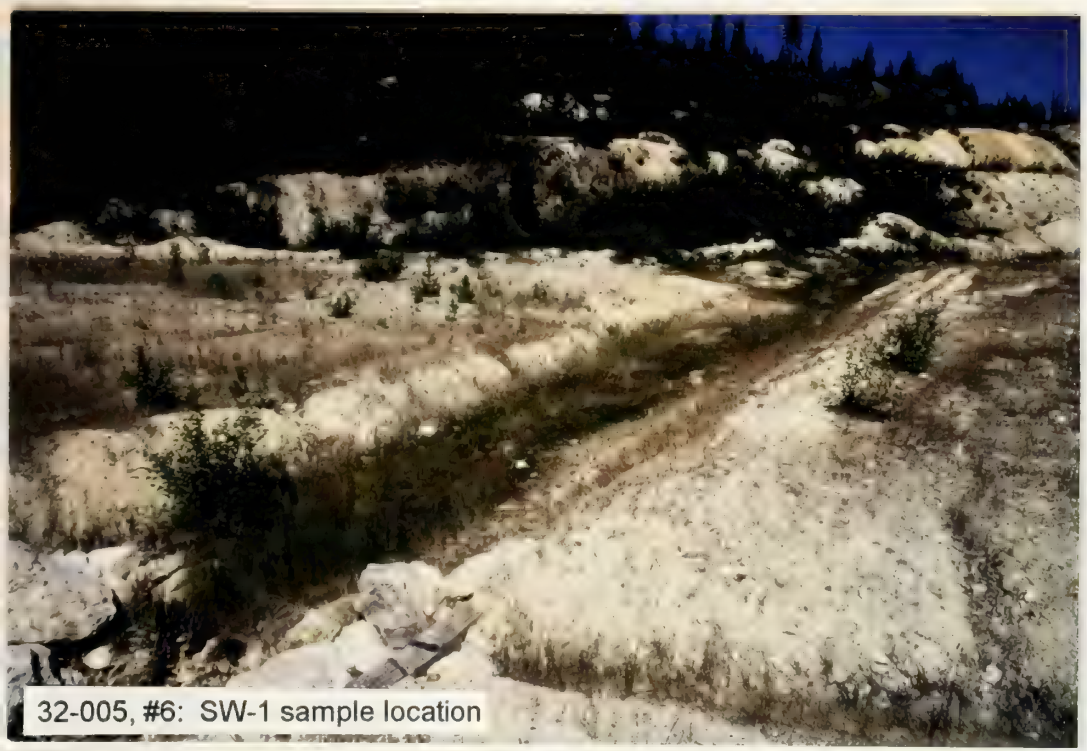
			SITE NAME:	WARD LODE MINE
LINE NO.		**SITE SAFETY**	PA NUMBER:	32-005
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	75
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**1.50**



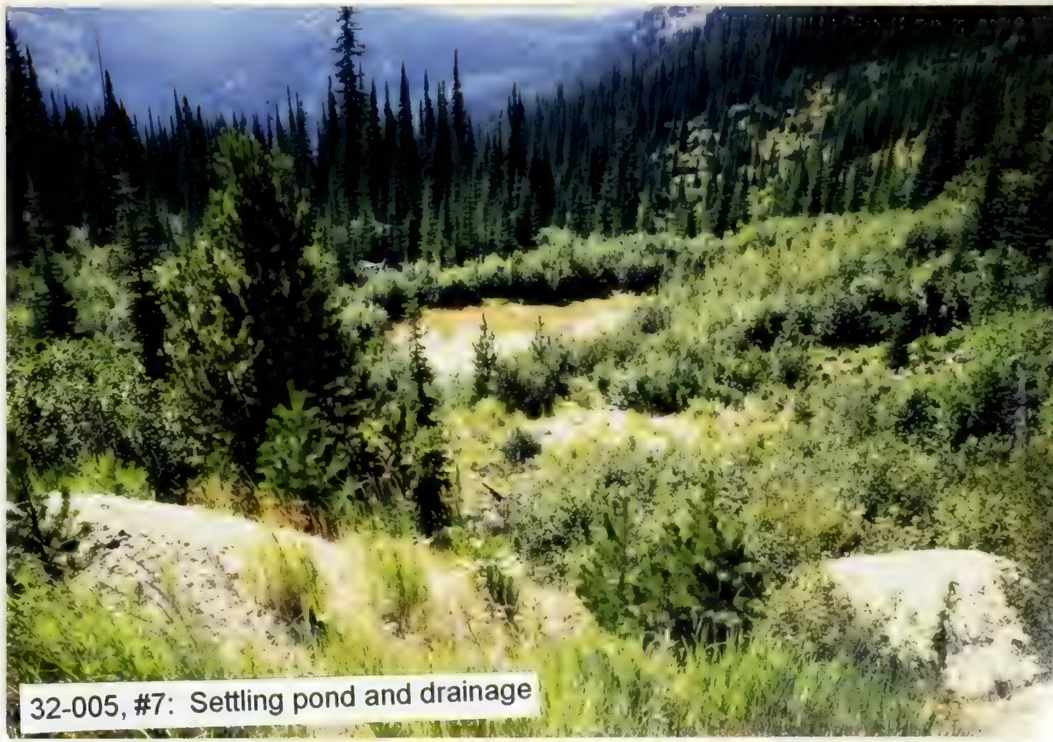
32-005, #4: WR-1, facing south



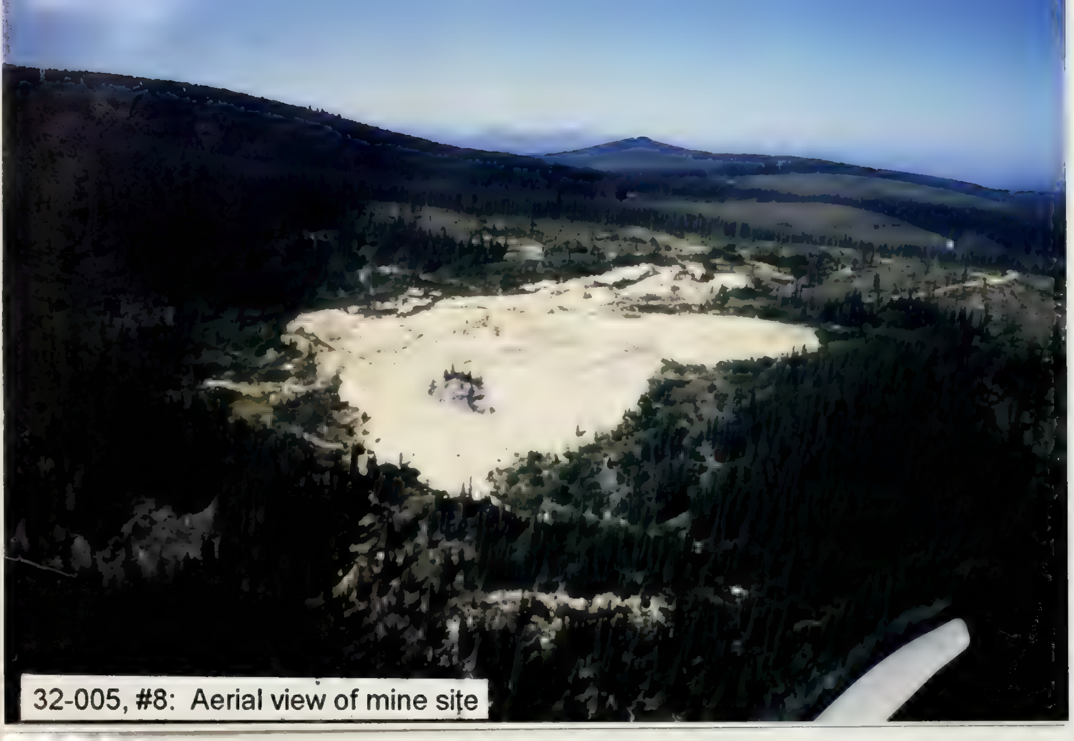
32-005, #5: Open cut

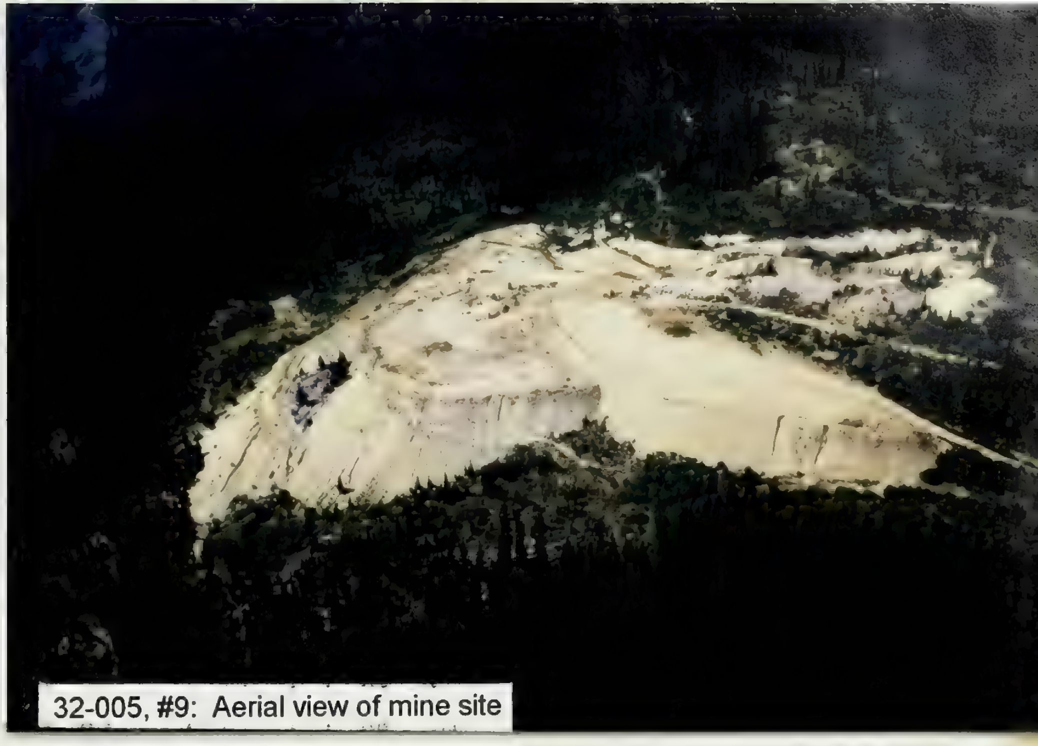


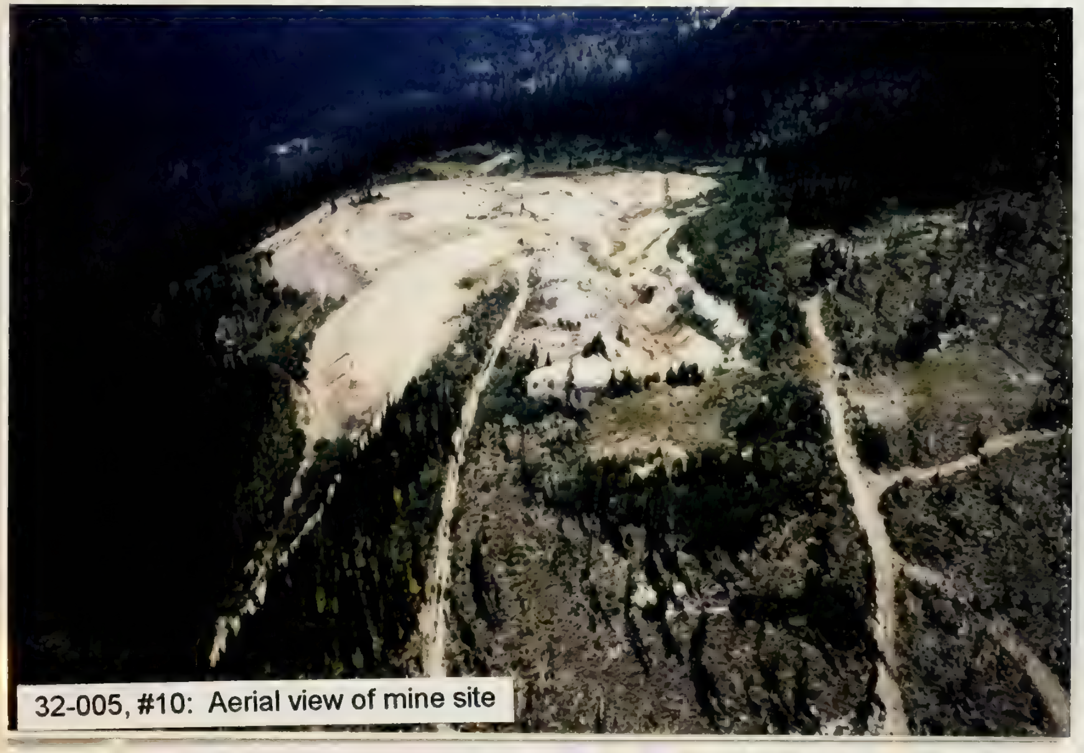
32-005, #6: SW-1 sample location



32-005, #7: Settling pond and drainage


32-005, #8: Aerial view of mine site


32-005, #9: Aerial view of mine site


32-005, #10: Aerial view of mine site

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: UPPER TRIANTLER **PA#:** 32-048

Date: September 8, 1993 **Time:** 0800-0915

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Calm; clear; approx. 50°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: WR-1; #2: Wetland; #3: Shaft (HMO from air). Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close shaft HMO on top of dump. Grade, amend, and revegetate dump at toe of hill if necessary.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): UPPER TRIANTLER PA#: 32-048

Legal Description: T 12N ;R 22W ;Sec. 27 , NW1/4 NW1/4 ___1/4

County: MISSOULA Mining District: WOODMAN

Latitude: N 46° 46' 29" Longitude: W 114° 21' 32"

Primary Drainage Basin and Code: Lolo Creek/17010205
Secondary Drainage Basin: Lolo Creek

USGS Quadrangle map name(s): Camp Creek

Mine Type/Commodities: Hardrock/Unknown, possibly Copper

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Don Stillwell, Phelps Dodge Corp., 200 Union Boulevard, Suite 30, Lakewood, CO 80228.

Relationship to other mines/sites in the area/district: Close proximity to the Sheldon mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3760', Slope 20°,
Aspect Southwest

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? < 0.25 acres.
Dimensions:

Predominant vegetation types: Ponderosa and Lodgepole pines, Mountain maple, Engleman spruce, knapweed

Access: roads - good X ,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites). Good access to dump; difficult up to shaft.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the north side and above perennial Lolo Creek. Lolo Creek flows southeast away from the site. The site is underlain by schist and argillite.

Mining/milling history, ore type/tenor, host rock, gangue: Mine was inaccessible by 1956. Dump material is composed of bluish schist grading into argillite. Gangue material appeared to be quartz with pyrite and chalcopyrite. No production records were available.

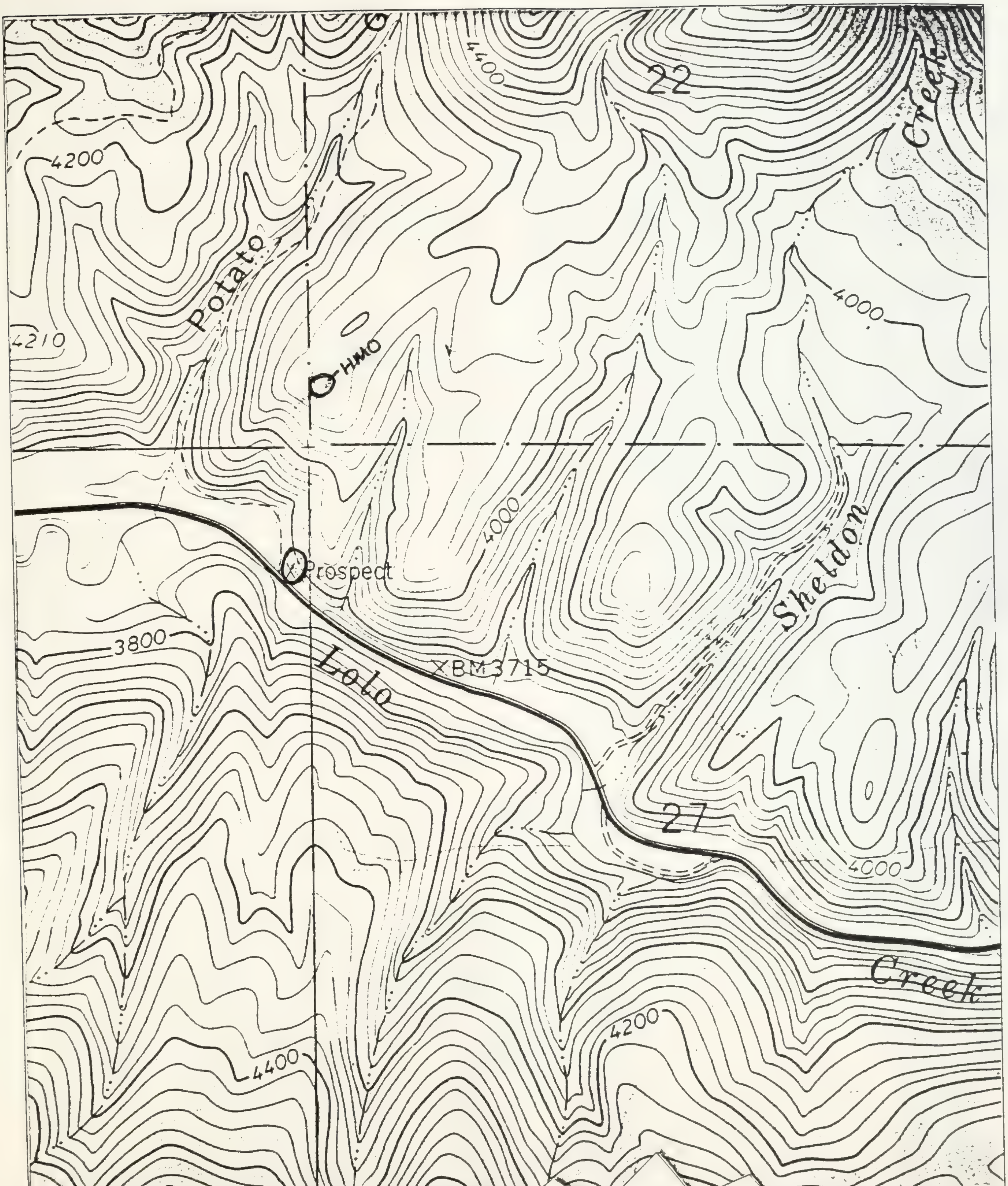
Mine Operation?
Shafts - Yes X, No ___, # 1, Comment Open, HMO
Adits - Yes X, No ___, # 1, Comment Caved
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

UPPER TRIANTLER, P.A. NO. 32-048

T12N, R22W, SECTION 27
SCALE: 1" = 1000'

LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
	OPEN ADIT		CULVERT
	COLLAPSED ADIT	☼	LIGHT (LIGHT POLE)
	OPEN SHAFT	⦸	UTILITY POLE
⧗	COLLAPSED SHAFT		CENTERLINE MONUMENT
	EXCAVATION	■	DECIDUOUS TREE
		●	CONIFEROUS TREE
	WASTE ROCK DUMP		WOOD FENCE
			WIRE FENCE
	COLLAPSED TIMBERS	▨	BUILDING
	RAILS	○	BARRIER POST
	DUMP		GATE
	LAB SAMPLE		EDGE OF ASPHALT
	XRF SAMPLE		EDGE OF GRAVEL
	WATER SAMPLE GROUND AND SURFACE	▼	SLOPE DIRECTION
	DRAINAGE		
●	WATER WELL		PONDED WATER
			WETLANDS VEGATATION

PIONEER TECHNICAL SERVICES INC.

THOMAS, DEAN & HOSKINS INC
ENGINEERING CONSULTANTS

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

UPPER TRIANTLER PA# 32-048
WOODMAN DISTRICT MISSOULA COUNTY

1

1

32-048.DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,700	Southwest end of dump	None	6.8 (D)	0.055	32-048-WR-1	09/08/93 1800	T-Metals, ABA
WR-1B	WR		East side of dump	None	7.0 (D)	0.05			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-048-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 14

Distance to nearest well used for drinking? Approx. 0.9 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X_.
Workings do not appear to contact groundwater and do not appear to hav
significant volumes of precipitation/runoff percolation.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Lolo Creek is approx. 200 feet to the south isolated by Highway 12.

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Wetlands 50 feet to the west isolated by gravel road.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1

Approximate Flood frequency? ___ 1 yr, ___ 10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 100 cfs , Average Flow: 10 cfs

Distance between waste source(s) and nearest surface water body (ft)? 50 feet

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A

SURFACE WATER INVENTORY FORM

SAMPLERS:

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow' cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No samples taken due to waste source isolation by cultural features.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 5 acres

Wetlands present: Yes X **, No** ___ **, Describe:** 1 acre natural wetland located just west of the mine.

Carbonate rocks/soils: Yes X **, No** ___ **, Describe:** Some dump material contained calcareous and dolomitic bands.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 X ; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? Approx. 0.9 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	3,060	2,601	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Fishing on Lolo Creek

Accessibility - Fences, warning signs, closed roads? Dump is directly adjacent to Highway 12; shaft is on ridge (steep climb) above the highway.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _2_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Shaft on top of ridge is dangerous.

Hazardous structures: Yes___, No_X_, Number____, types and locations:____________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957, p. 39.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Upper Triantler, Prepared by Northern Engineering and Testing, September 25, 1988.

USGS, Topographic Map, Camp Creek, Montana, 7 1/2 minute Quadrangle,

LABORATORY ANALYTICAL DATA

UPPER TRIANTLER
PA NO. 32-048

Upper Triantler PA# 32-048
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32-048-WR-1	4.79 U	57.1	0.5 U	8.23	5.22	81.2	15100	0.182 J	352	13.3	105	6.24 UJ	51 J	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32-048-WR-1	0.01	0.31	114	114	<0.01	0.01	0.04	0.31	114

LEGEND

WR1 - Composite of subsamples WR1A and 1B.
BACKGROUND - From the Mill Creek Mine (32-049-SS-1).

XRF ANALYSIS RESULTS

UPPER TRIANTLER
PA NO. 32-048

Mine Name: Upper Triantler PA# 32-048
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-048-WR1-A		36249.4	8763.39	1949.59			30659.3	282.01 *	129.705 *	122.509 *		66.067
32-048-WR1-B	286.309 *	43073.2	32592.6	2524.64		808.799 *	20127.2		107.769 *	62.6908 *		89.8578
32-048-WR-1-COMP		40975.2	20272	2474.33		505.901 *	27253.6		110.299 *	92.6033 *		75.134

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-048-WR1-A	184.071		6.05943 *	16.3875 *	223.183			809.238			18.4086 *
32-048-WR1-B	300.728			84.0099	207.362			1321.08		15.5374 *	22.0182 *
32-048-WR-1-COMP	228.69			61.4645 *	220.699			1045.58		11.8773 *	16.167 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

UPPER TRIANTLER
PA NO. 32-048

AIMSS SCORESHEET

SITE NAME: UPPER TRIANTLER
PA NUMBER: 32-048

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.092
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		11
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	18.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	681

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.106
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		10
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	27
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1145

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0

DIRECT CONTACT PATHWAY

LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.02**

SITE NAME: UPPER TRIANTLER
PA NUMBER: 32-048

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**12.00**

32-048, #1: WR-1

32-048, #2: Wetland

32-048, #3: Shaft

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MILL CREEK MINE PA#: 32-049

Date: September 8, 1993 Time: 1245-1400

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Clear; slight breeze; warm (75°-80°); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #11: WR-1; #12: Adit; #13: Lower dump cut for roadfill. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Lower dump (WR-2) has been partially used for logging road construction fill.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close HMO; revegetate dump, if necessary.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MILL CREEK MINE PA#: 32-049

Legal Description: T 11N ;R 21W ;Sec. 9 ,NE 1/4 NE1/4 ___1/4

County: MISSOULA Mining District: WOODMAN

Latitude: N 46° 43' 55" Longitude: W 114° 14' 15"

Primary Drainage Basin and Code: Lolo Creek/17010205
Secondary Drainage Basin: Mill Creek

USGS Quadrangle map name(s): Carlton Lake

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Champion International. (406) 258-5511.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4900', Slope 25°,
Aspect East

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 0.1 acres.
Dimensions: 100 feet x 30 feet

Predominant vegetation types: Ponderosa pine, Douglas fir, larch, Mountain maple, boysenberry, huckleberry

Access: roads - good___,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites).
Possible locked gate

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the north side of dry, intermittent tributary to Mill Creek. It's confluence with Mill Creek is approximately 1/3 mile away. Mill Creek flows north to Lolo Creek 1 to 2 miles away.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

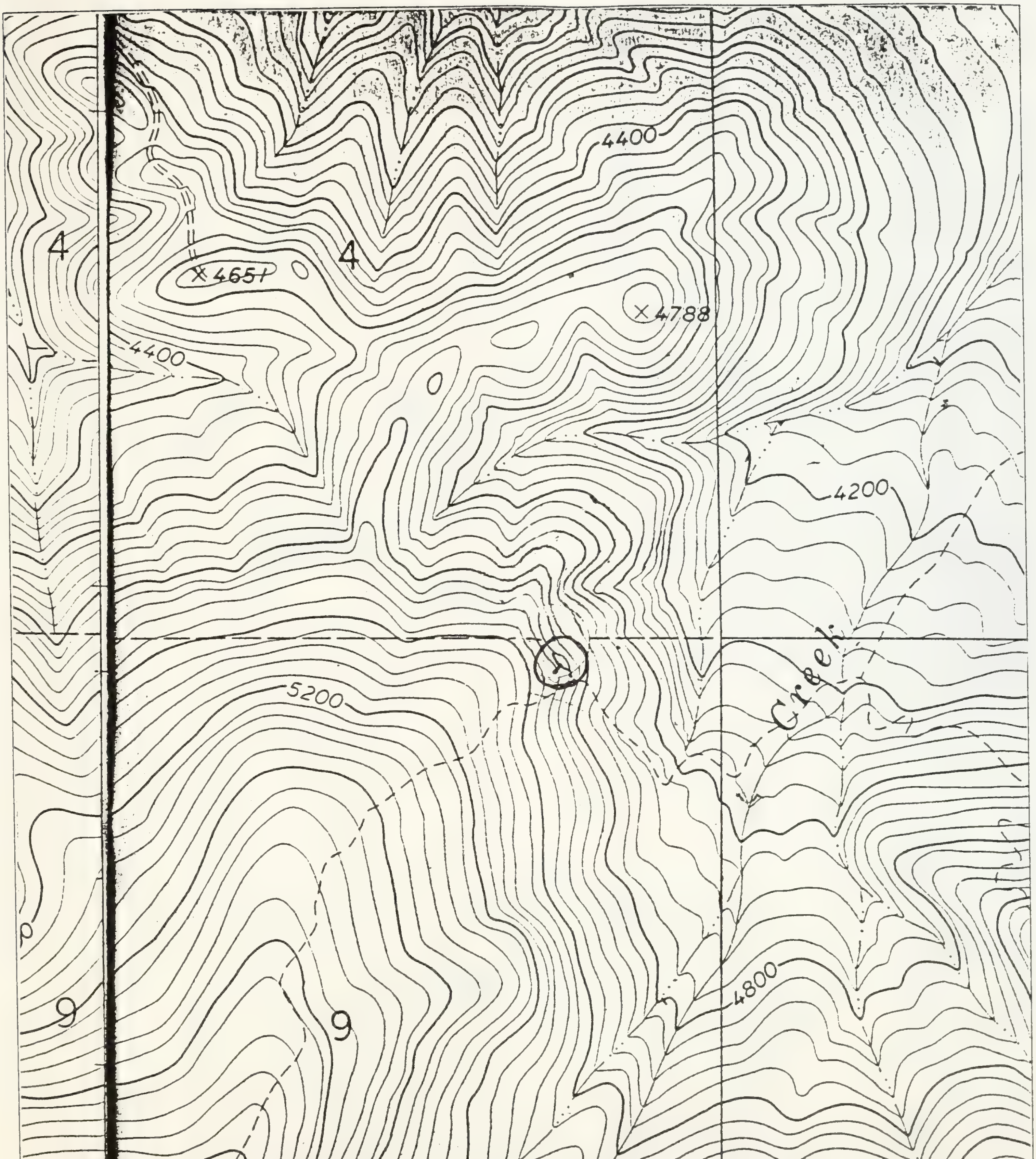
Mine Operation?
Shafts - Yes___, No X , # ____, Comment
Adits - Yes X , No___, # 2 , Comment 1 open; 1 caved
Pits - Yes X , No___, # 1 , Comment Small exploration pit
Placers - Yes___, No X , # ____, Comment
Other - Yes X , No___, # 1 , Comment Trench (small)

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

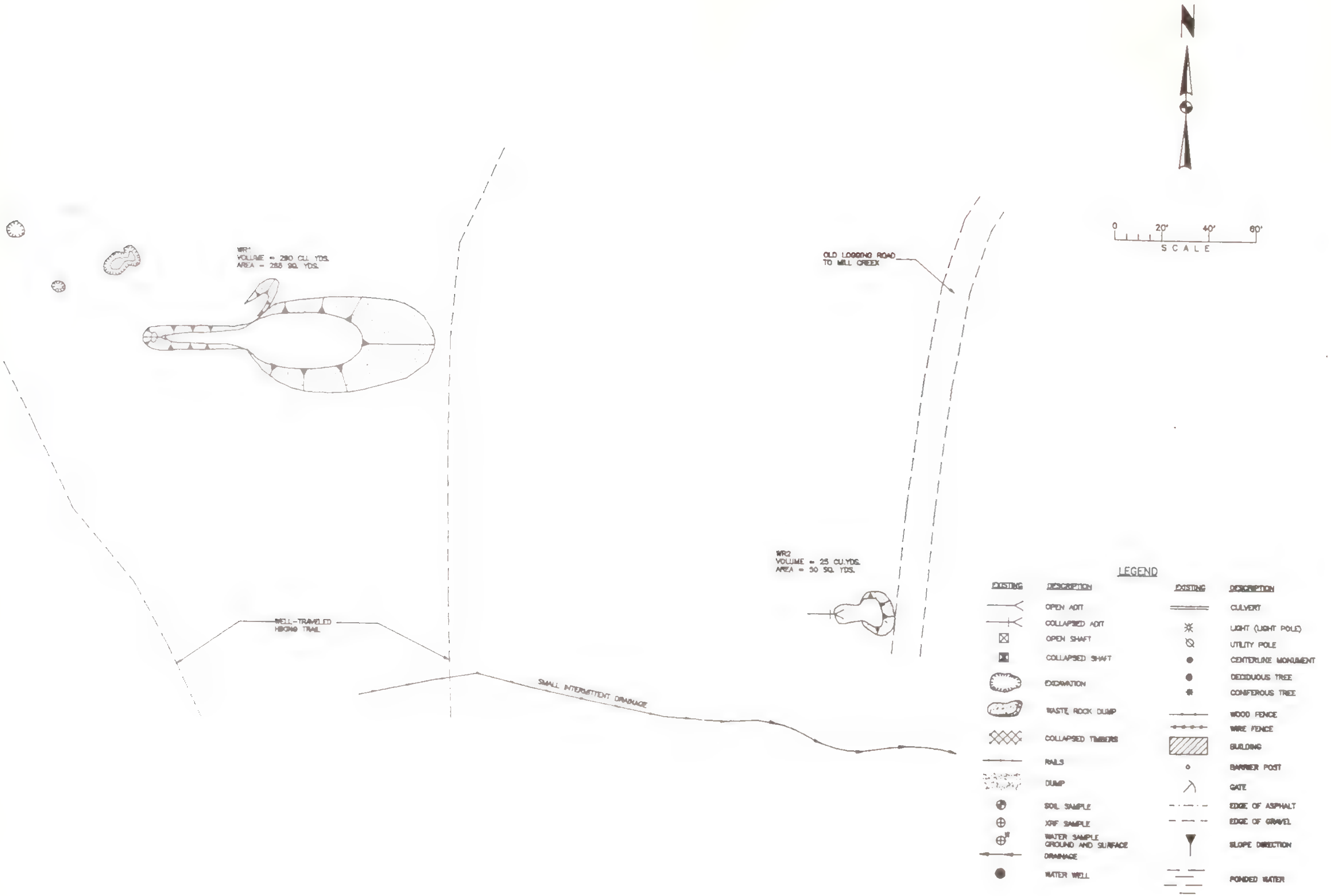


PIONEER TECHNICAL SERVICES, INC.

MILL CREEK MINE, P.A. NO. 32-049

T11N, R21W, SECTION 09

SCALE: 1" = 1000'



DRAWN MEF DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MILL CREEK PA# 32-049
WOODMAN DISTRICT MISSOULA COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	290	West end of dump near adit	None	6.4 (D)	0.02	32-049-WR-1	09/08/93 2210	T-Metals, ABA
WR-1B	WR		East end of dump	None	6.6 (D)	0.04			
WR-2	WR	25	Small exploration dump	None	N/A	N/A	N/A	N/A	N/A
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	32-049-SS-1	09/08/93 1245	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 32-049-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 106

Distance to nearest well used for drinking? Approx. 1.5 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Shallow limited workings

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):______________________

Dry streambeds: Yes_X__, No___, Name(s): Very small intermittent drainage approx. 100 feet south of WR-1. The drainage is an unnamed tributary to Mill Creek.

Other surface water: Yes____, No_X_, Name(s)/Description:__________

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A

High Flow:___________, Average Flow:______________

Distance between waste source(s) and nearest surface water body (ft)?_ Approximately 1/3 mile

Surface water draining onto or through waste sources: Yes____, No_X__, Describe:______________________

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X__, Distance downstream (ft)?_________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe: None observed

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Dry	2,400	2,190	No	None
WR-2	None	Dry	450	270	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Litter; USFS hiking trail with regular use passes the site.

Accessibility - Fences, warning signs, closed roads? Walk in from locked gate; hiking trail past mine.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment
Wilderness Area - Yes___, No X , Comment
T&E Species Habitat - Yes___, No X , Comment
Bat Habitat - Yes___, No X , Comment

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Adit at WR-1

Hazardous structures: Yes___, No X , Number____, types and locations:

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:

Fire and/or Explosion hazards: Yes___, No X , Explain:

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Mill Creek mine, Prepared by Chen-Northern, September 24, 1988.

USGS, Topographic Map, Carlton Lake, Montana, 7 1/2 minute Quadrangle, 1967.

LABORATORY ANALYTICAL DATA

MILL CREEK MINE
PA NO. 32-049

Mill Creek PA# 32-049
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
32–049–WR–1	4.89 U	183 J	0.5 U	31.1 J	16.8	139 J	40300	0.713	741 J	28.1	12.9	6.36 UJ	77.2	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
32–049–WR–1	<0.01	0	8.77	8.77	<0.01	<0.01	0.01	0	8.77

LEGEND

WR1 – Composite of subsamples WR1A and 1B.
BACKGROUND – From the Mill Creek Mine (32–049–SS–1).

XRF ANALYSIS RESULTS

MILL CREEK MINE
PA NO. 32-049

Mine Name: Mill Creek PA# 32-049
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
32-049-WR1-A		26427	15488.7	6354.69		1068.64 *	74916.8	492.432 *	220.849	130.133 *		176.887
32-049-WR1-B		39950.2	9553	2978.21		1071.58 *	39629.1	299.367 *	48.4837 *	106.101 *		106.314
32-049-WR-1-COMP		29120.6	12089.4	4344.81		923.361 *	59098.9		166.516 *	105.964 *		136.237

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
32-049-WR1-A	255.798		11.4005 *		189.818			432.097			10.9361 *
32-049-WR1-B	247.76	38.981 *			234.651			717.809			15.6196 *
32-049-WR-1-COMP	194.686		7.55265 *		196.399			480.617		11.2199 *	12.87 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MILL CREEK
PA NO. 32-049

AIMSS SCORESHEET

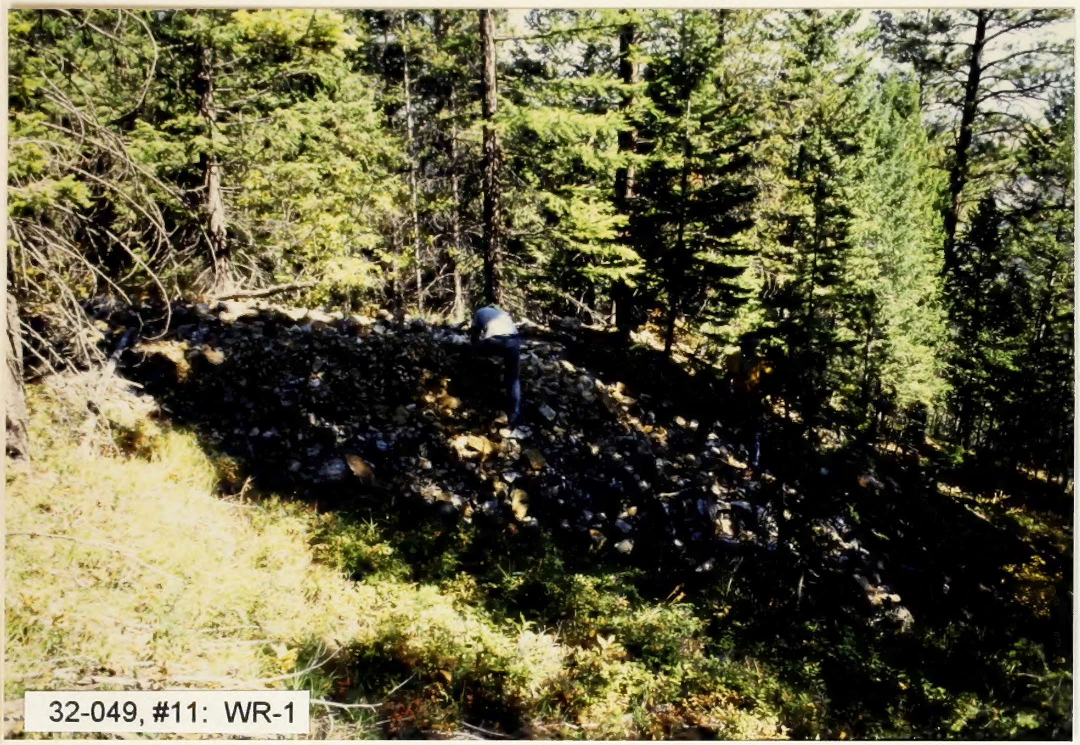
SITE NAME: MILL CREEK MINE
PA NUMBER: 32-049

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		106
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	106.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	13
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.006
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	0
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	75
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

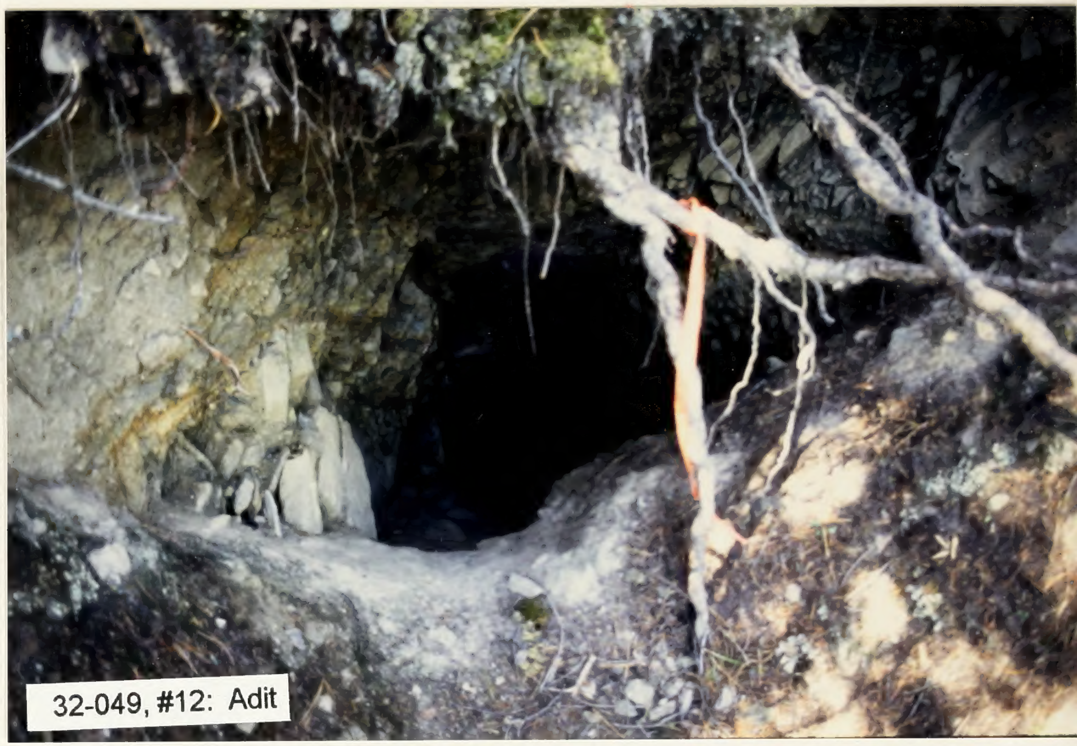
SITE NAME: MILL CREEK MINE
PA NUMBER: 32-049

SITE SAFETY

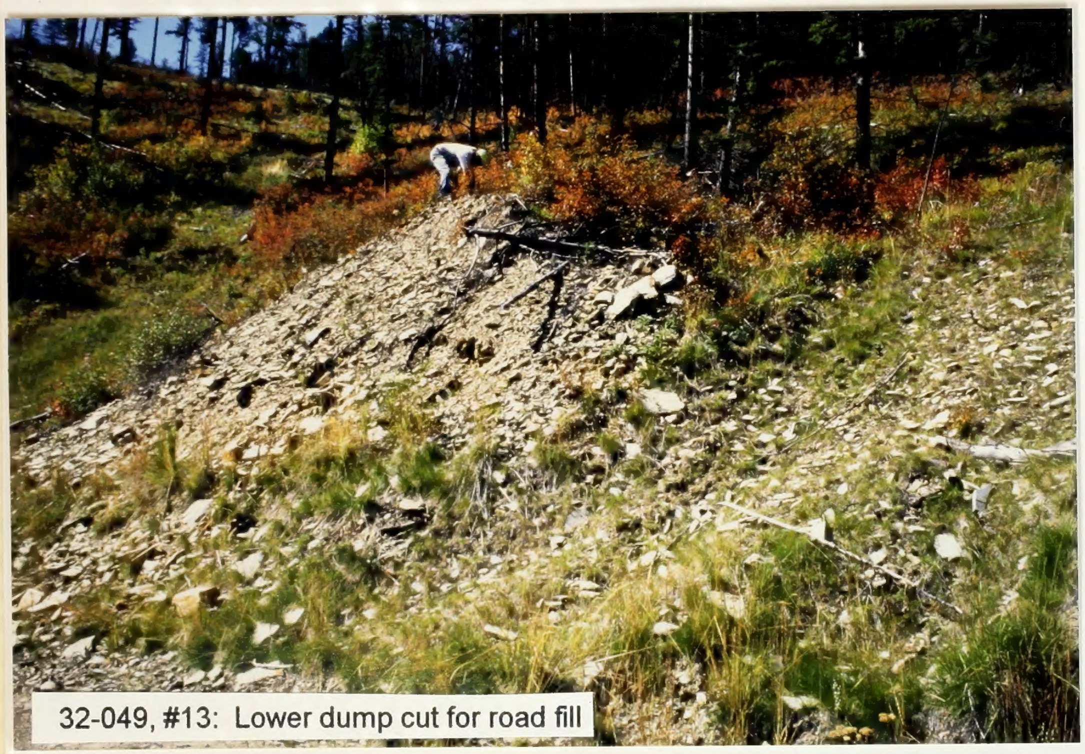
LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.50**



32-049, #11: WR-1



32-049, #12: Adit



32-049, #13: Lower dump cut for road fill